MPR 8040.1
REVISION D
EFFECTIVE DATE: December 20, 2004
EXPIRATION DATE: December 20, 2009

MARSHALL PROCEDURAL REQUIREMENTS

ED01

CONFIGURATION MANAGEMENT, MSFC PROGRAMS/PROJECTS

DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Canceled)	Document Revision	Effective Date	Description
Baseline		5/14/99	Document converted from MSFC-P04.2 to a Directive. Previous history retained in system as part of canceled or superseded ISO Document files.
Revision	A	8/20/99	Changed "Chief Engineer" to indicate Program/Project Manager or Systems Engineer throughout document. P.2: Revised to state that during the formulation phase, provisions shall be made for initiation of CM requirements via a CMP tailored to the Program, Project, or activity. Also revised to state that the requirements of this procedure apply during formulation and implementation phases. P.4: Deleted MM 8040.12; added MWI 8040.3, MIL-STD-100, MIL-STD-961, and MIL-STD-973. P.5: Added MMI 8040.15. P.6, 3.1, 3.2: Cancelled MM 8040.12; detailed data requirement information incorporated into Configuration Management standard Data Requirements Descriptions. Section 3: In first paragraph, deleted "in accordance with MMI 8040.15" and added the last sentence. 3.1: Added last two sentences. 3.2: Changed last sentence to read: "Contract requirements for change control shall be in accordance with the requirements of MIL-STD-973, except as modified in the contract data requirements descriptions, and the use of MSFC forms will be used for engineering changes, waivers, and deviations." 3.2 and 3.3.2: Added MWI 8040.3 for deviation and waiver process. 3.2.5: Added "DAR's" and "MWI 8040.3." 3.4.1: Added last sentence. Flow Diagram: Blocks 3.1 and 3.2: Deleted MM 8040.12. Block 3.2, added MWI 8040.3.
Revision	B	3/22/00	P.1, 2nd sentence: Changed to "This procedure addresses the planning and implementation of the basic . . ." In last sentence, changed to ". . . configuration management requirements . . ." P.2, Exception: Changed to "All programs/projects initiated . . ." In 3rd sentence, changed to "All new Programs/Projects initiated . . ." P.4: Deleted MSFC-MNL-1833 and MPG 1441.1; added MWI 7120.4 and MPG 1440.2.; renumbered section. P.6: Changed to: "Cancelled MPG 8040.1A dated August 20, 1999." 1.9: Added definition for Configuration Documentation and renumbered remainder of section. 1.18: Changed "Documentation Release System (DRS)" to "Integrated Configuration Management System (ICMS)" and ". . . MSFC drawings, specifications, and documents" to ". . . configuration documentation." Renumbered remainder of the section. 1.29: Changed definition of specification to read: A document which clearly and accurately describes essential technical and interface requirements for products and the criteria for determining whether those requirements are met." Renumbered paragraphs to end of section. 1.29 (former number): Deleted definition of SCN/DCN. 2.1: Deleted "Quality" in last sentence. 2.3: Changed to read: "Personnel responsible for preparing or assisting in the preparation of . . ." 3.1: Added second sentence: "Document preparation instructions are specified in MWI 7120.4." In third sentence, changed to read: "Release of in-house-developed. . . and will be implemented on all configuration

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			documentation." 3.1.3: In first sentence, changed "design" to "implementation" phase. 3.1.4: In first sentence, changed to read: ". . . at the end of the design and development portion of the implementation phase." 3.1.5: In first sentence, changed to read: ". . . prior to operational portion of the implementation phase." 3.2.2.5: Changed 1st sentence to read: "Managers for Project Offices may authorize the establishment of a Level IV CCB, designate the Chair, and identify the baseline level to be controlled by the Level IV CCB." 3.3.1.1.i: Deleted "SCN's, DCN's." 3.3.2: Changed "Documentation Release System (DRS)" to "Integrated Configuration Management System (ICMS)." Added: "ICMS provides data on the release status of configuration documentation and configuration documentation changes, and maintains the parts list information which captures the detailed "as-designed" configuration for a configuration item. Changed last sentence to read: ". . . requirements of MSFC-STD-555 and MWI 8040.3." 3.4: Changed paragraph heading to "Functional and Physical Configuration Audits and CM System Audits." Change 1st sentence to read: "Functional and Physical Configuration Audits and CM System Audits are the processes for . . ." 3.4.1: Changed paragraph heading to "Functional and Physical Configuration Audits." 4: Deleted "Quality" and changed "MPG 1441.1" to MPG 1440.2." 5: Block 3.3: Deleted "MSFC-MNL-1833." Block 3.4: Changed "Configuration Verification/Audits" to "Functional and Physical Configuration Audits and CM System Audits."
Revision	C	6/14/01	P.2, 5th line deleted "which complied with MMI 8040.15." P4.d - Deleted MPG 8060.1. P4.j - Replaced "MSFC-PROC-1916" with "MWI 8040.7, Configuration Management Audits, MSFC Programs/Projects." P4.o - Changed to include Interim Notices 1 through 3, dated January 13, 1995. Added P4.p - "MWI 8040.6, Functional and Physical Configuration Audits, MSFC Programs/Projects." P5 -Deleted a reference to MMI 8040.5, Configuration Management. P6 - Cancelled MPG 8040.1B, dated March 22, 2000. 1.5 deleted "MPG 8060.1" and replaced with "MWI 8040.6." 3.4.1, Deleted all references to "MPG 8060.1" and replaced with "MWI 8040.6." 3.4.2, Deleted "MSFC-PROC'1916" and replaced with "MWI 8040.7." 5. Changed flow diagram block 3.4 to delete MPG 8060.1 and MSFC-PROC-1916 and replace with MWI 8040.6 and MWI 8040.7. [Footer URL updated 01/14/2004 by Directives Manager.]
Revision	D	12/20/2004	Utilized "shall" language and made format changes per Rules Review. In the body of MPR 8040.1, scrubbed requirements, added requirements on release, changed configuration accounting requirements to specify required data capture and that use of the Change, Processing, Tracking, and Accounting System (CPTAS) is optional. Integrated requirements and guidance from MWI 8040.1 (CM Plan), MWI 8040.2 (Configuration Control), MWI 8040.3 (Deviation/Waiver), MWI 8040.6 (FCA/PCA), and MWI 8040.7 (CM Audits) into MPR 8040.1 as described in the following. Integrated high level requirements for producing a CM Plan

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			from MWI 8040.1 (CM Plan) into MPR 8040.1 and put the CM Plan and Software CM Plan outlines and content definition into Appendix Z Guidance. Moved simplified configuration control requirements from MWI 8040.2 (Configuration Control) into MPR 8040.1 Appendix B and moved simplified deviation/waiver requirements from MWI 8040.3 (Deviation/Waiver) into MPR 8040.1 Appendix C. Changed control requirements to specify minimum data capture for ECRs, DARs, CCB Directives with use of MSFC forms as optional. Added an approval matrix for engineering documentation with minimum approvals specified, with Project option to establish a Project-unique matrix. Place MWI 8040.6 (FCA/PCA), and MWI 8040.7 (CM Audits) into Appendix Z.

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PREFACE

P.1 PURPOSE

This Marshall Procedural Requirement (MPR) provides a consistent and systematic method for Marshall Space Flight Center (MSFC) programs, projects, and activities to plan, develop, implement, and maintain configuration management (CM) systems which meet the requirements of NPR 7120.5, "NASA Program and Project Management Processes and Requirements," MPD 1280.1, "Marshall Management Manual," and MPR 7120.1, "Program/Project Planning." This document addresses the planning and implementation of the basic CM functions: Configuration Identification, Configuration Control, Configuration Accounting, and Configuration Verification and Audits.

P.2 APPLICABILITY

This MPR shall apply to all MSFC programs/projects initiated after September 1, 1997, beginning during the formulation phase and continuing throughout their program/project life-cycle. MSFC programs/projects initiated before September 1, 1997, and which have an approved Configuration Management Plan (CMP) are exempt from the requirements of this MPR. The CM requirements contained in this document shall apply to flight, qualification, and protoflight hardware/software, designated development hardware/software, configuration item (CI)-associated support equipment, and CI-unique facilities.

P.3 AUTHORITY

a. MPD 1280.1, "Marshall Management Manual"

b. MPR 7120.1, "Program/Project Planning"

c. NPR 7120.5, "NASA Program and Project Management Processes and Requirements"

P.4 APPLICABLE DOCUMENTS

a. ASME Y14.100, "Engineering Drawing Practices"

b. MIL-STD-961, "Defense Specifications"

c. MPR 1440.2, "MSFC Records Management Program"

d. MPR 8060.1, "Flight Systems Design/Development Control"

e. MPR 8730.3, "Control of Nonconforming Products"

f. MSFC-MNL-1951, “Change Processing, Tracking, and Accounting System (CPTAS) User’s Guide”

g. MSFC-STD-555, “MSFC Engineering Documentation Standard”

h. MSFC-STD-3394, “Standard for Contractor Configuration Management for MSFC Programs/Projects”

i. MWI 7120.4, “Documentation Preparation, Programs/Projects”

j. MWI 8040.5, “Floor Engineering Orders and Floor Engineering Parts Lists (FEOs/FEPLs)”

k. MWI 8730.3, “MSFC Material Review Board”

l. NPR 7120.5 “NASA Program and Project Management Processes and Requirements”

P.5 REFERENCE

a. QD-QA-027, “Summarizing As-Built-Configuration”

b. MSFC Form 516, “Change Evaluation”

c. MSFC Form 847, “Deviation/Waiver Approval Request”

d. MSFC Form 2312, “Control Board Directive”

e. MSFC Form 2327, “Engineering Change Request”

f. MSFC Form 2348, “Engineering Change Proposal”

g. MSFC Form 2490, “Installation Notice Card”

h. MSFC Form 4229, “Interface Revision Notice/Preliminary Interface Revision Notice”

P.6 CANCELLATION

MPG 8040.1C dated June 14, 2001
MWI 8040.1E dated June 14, 2002
MWI 8040.2C dated February 5, 2002
MWI 8040.3A dated June 7, 2004
MWI 8040.6A dated February 2, 2002
MWI 8040.7 dated May 31, 2001

Original signed by
Robin N. Henderson for

David A. King
Director

DOCUMENT CONTENT

1. DEFINITIONS

1.1 Allocated Baseline. The approved and released configuration documentation describing a CI's performance, interoperability, and interface requirements that are allocated from a system or higher level CI and the verifications required to demonstrate the achievement of these specified requirements.

1.2 As-Built Configuration. Defines the actual hardware condition as a result of inspections performed and documented on the parts tags during the manufacturing and assembly process. For in-house projects, the as-built configuration is provided as an end-item summary under QD-QA-027, "Summarizing As-Built Configuration."

1.3 As-Designed Configuration. Consists of the original released design drawings, parts lists, and changes thereto used to initiate the manufacture and assembly process. It is usually summarized by the end item or configuration item.

1.4 Auditor. A team or individual authorized to conduct a specific audit.

1.5 Change Package. The consolidated record, assigned a unique number, of all pertinent information associated with requesting, processing, and implementing a baseline, change or deviation/waiver. The typical change package includes the change request or deviation/waiver, supporting documentation, change evaluations, change board directives with authorized implementation actions, and action closure data.

1.6 Change Package Engineer (CPE). A person with expertise in the technical areas affected by a change who is assigned to consolidate pertinent data and change evaluations and recommend a change disposition to the appropriate CCB.

1.7 Change Processing, Tracking, and Accounting System (CPTAS). A MSFC data processing system that tracks the review, approval, and implementation status of changes to configuration item (CI) baselines controlled by a Configuration Control Board (CCB).

1.8 Change Request (CR). A generic term for a proposed engineering change. MSFC utilizes an Engineering Change Request, MSFC Form 2327, or equivalent. Also see Engineering Change Request definition.

1.9 CI-Associated Support Equipment. Any mechanical, electrical, or electro-mechanical equipment, e.g., handling fixture or test set, which is a part of a program/project CI which interfaces with the CI and which is designated for CM.

1.10 CI-Unique Facility. Any fixed installation, e.g., test stand or launch mechanism, which is part of a program/project CI and interfaces with the CI. This includes real property and installed

equipment. This does not include the normal "brick and mortar," utilities, fluid/gas delivery systems, or other delivery systems that do not affect the end-use function of the CI or that are not controlled by applicable CI programs/projects.

1.11 Commercial and Government Entity (CAGE) Code. A five-character alpha-numeric code which is assigned to commercial and Government activities that manufacture or develop items, or provide services or supplies for the Government. When used with a drawing number or part number, the CAGE code designates the design activity to which the drawing or part number is assigned.

1.12 Computer Software Configuration Item (CSCI). An aggregation of software that satisfies an end-use function and is designated for separate configuration management by the acquirer; CSCIs are selected based on tradeoffs among software function, size, host or target computers, developer, support concept, plans for reuse, criticality, and interface considerations.

1.13 Configuration. The functional and physical characteristics of a product (hardware, firmware, software, or a combination thereof) as defined in technical documentation and achieved in a product.

1.14 Configuration Accounting. Formalized recording and reporting of the established configuration documents, the status of proposed changes, and the status of the implementation of approved changes.

1.15 Configuration Baselines. A configuration baseline consists of all released configuration documentation that represent the definition of the CI at a specific point in time. The baseline serves as the basis for defining changes to the CI. Specific configuration baselines consist of the Functional, Allocated, and Product Baselines (see separate definitions for these baselines).

1.16 Configuration Control. The systematic definition, evaluation, coordination, and disposition of each proposed change, deviation, or waiver to the CI baseline and the implementation of each approved change in the configuration of the CI.

1.17 Configuration Control Board (CCB). The functional body responsible for establishing baselines, and reviewing and dispositioning all changes, deviations, and waivers to these baselines.

1.18 Configuration Control Board (CCB) Chairperson. The CCB Chairperson, or the Alternate CCB Chairperson, directs the configuration control process and dispositions all changes or deviations/waivers that are proposed and processed through the CCB.

1.19 Configuration Control Board (CCB) Members. The CCB Members review changes and deviation/waivers processed through the CCB and advise the CCB Chairperson on the impacts to their area and the disposition of the changes.

1.20 Configuration Control Board (CCB) Secretariat. The CCB Secretariat establishes and implements the configuration control process associated with the CCB.

1.21 Configuration Documentation. The program/project-specific technical documentation (drawings, parts lists, specifications, standards, interface control documents/drawings (ICDs), version description documents (VDDs), and documents invoked therein) that identify and define the item's functional and physical characteristics.

1.22 Configuration Identification. Configuration identification includes the selection of CIs; the determination of the types of configuration documentation required for each CI; the issuance of numbers and other identifiers affixed to the CIs and to the released technical documentation that defines the CI configuration.

1.23 Configuration Item (CI). An aggregate of hardware, firmware, software, or any of its discrete portions, which satisfies an end-use function and is designated for CM. CIs may vary widely in complexity, size, and type.

1.24 Configuration Management (CM). A discipline applying technical and administrative direction and surveillance over the life cycle of a CI to accomplish the following tasks:
a. Identify and document the functional and physical characteristics of a CI.
b. Control changes, deviations, and waivers to these technical requirements.
c. Record and report change processing and implementation status.
d. Verify, through configuration verification and audits, that configuration items have been properly identified, approved, released and controlled throughout the program/project life cycle.

1.25 Configuration Management (CM) Audits. Audits that are performed by CM personnel on designated organization(s) having CM systems responsibility for configuration items, to determine if the subject organization have the mechanisms in place capable of executing the CM functions (control, accounting, etc.) in a closed loop manner.

1.26 Configuration Verification and Audits. A closed loop process by which all actions associated with the approval of CI documentation are tracked through closure and the technical reviews and audits necessary to verify that the configuration of systems and CIs are in compliance with configuration identification documentation.

1.27 Control Board Directive (CBD). A MSFC Form 2312, or equivalent, which documents the CCB disposition and implementation actions for changes and deviation/waivers.

1.28 Critical Characteristic. A characteristic that is likely, if defective, to create or increase a hazard to human safety, or to result in failure of a system or major product to perform a required mission.

1.29 Design Activity. A Government, commercial, or nonprofit organization responsible for the design of a product.

1.30 Deviation. A specific written authorization, granted prior to the manufacture of a configuration item, to depart from a particular requirement(s), with critical or major characteristics, of a configuration item's current approved configuration for a specific number of units or a specified period of time.

1.31 Deviation/Waiver Approval Request (DAR). MSFC Form 847 or equivalent which is used to request the approval of a deviation or waiver.

1.32 Effectivity. A designation defining the CI range (e.g., serial numbers, lot numbers, model, dates) or an event that the usage of a specific configuration applies, a change to a specific CI is to be or has been effected, or to which a variance applies.

1.33 Engineering Change Proposal (ECP). A document that describes a contractor-proposed change, identifies impacts, and provides justification for the proposal. The contractor submits the ECP to the Government for disposition. The program/project CCB is typically used to review and disposition the ECP, and the Contracting Officer (C.O.) sends the CCBs decision and direction to the contractor.

1.34 Engineering Change Request (ECR). A proposed engineering change used by MSFC personnel to submit documentation for initial baselining or to process changes to the baseline for evaluation and disposition by the appropriate CCB. MSFC utilizes MSFC Form 2327, or equivalent, to document ECRs.

1.35 Engineering Release. See Release.

1.36 Field Engineering Change (FEC). The method used to propose engineering changes at NASA using sites on equipment for which MSFC retains design responsibility and when time is not adequate to prepare and process an engineering change.

1.37 Finding. A discrepancy that violates CM requirements which is documented during a CM Audit and maintained as a record.

1.38 Firmware. The combination of a hardware device and computer instructions and/or computer data that resides as read-only software in the hardware device.

1.39 Functional Baseline (FBL). The approved and released configuration documentation describing a system or CI's functional, performance, interoperability, and interface requirements and the verification required to demonstrate the achievement of those specified functional requirements.

1.40 Functional Configuration Audit (FCA). The formal examination of functional characteristics of a configuration item, prior to acceptance, to verify that the item has achieved

the performance specified in the functional and developmental baseline identification documentation.

1.41 Installation Notice Card (INC). A form used after CI delivery to update the CM system and to certify that a particular modification package or FEC has been installed, tested, verified, and accepted in accordance with its associated change modification instructions.

1.42 Integrated Configuration Management System (ICMS). A MSFC interactive data processing system that provides documentation release information for configuration documentation. The ICMS allows the user (designer/engineer) to integrate an assembly and its component parts on the ICMS database, providing them with line item control and correlation of all related data elements.

1.43 Interface. Physical or functional interaction at the boundary between configuration items.

1.44 Interface Revision Notice (IRN). The form used to record approved changes to baselined interface documents, MSFC Form 4229 or equivalent.

1.45 Major Characteristic. A characteristic that analysis indicates is not critical but is likely, if defective, to result in failure of a configuration item to perform a required mission.

1.46 Minor Characteristic. A characteristic that analysis indicates is significant to product quality but is not likely, if defective, to impair mission performance of the part or configuration item.

1.47 Modification (Mod) Kit. A package containing necessary released documentation, hardware, software, modification instructions, and verification requirements to incorporate an approved engineering change into delivered CIs.

1.48 MSFC Release Desk. The MSFC functional entity (or entities) authorized as the official release point(s) for MSFC design activity configuration documentation or non-configuration documentation that meets MSFC release requirements. The Release Desk ensures that released data and changes have been appropriately authorized, that the released version of design data and the data relationship to configuration items are captured, and that release records are provided to the MSFC Repository as records custodians.

1.49 Observation. A discrepancy that does not violate CM requirements or a proposed process improvement which is documented during a CM Audit and maintained as a record.

1.50 Physical Configuration Audit (PCA). The formal examination of the as-built configuration item against its as-designed documentation.

1.51 Preliminary Interface Revision Notice (PIRN). An IRN form, MSFC Form 4229 or equivalent, used to describe proposed changes to baselined interface documents.

1.52 Product Baseline (PBL). The approved and released documentation describing the necessary functional and physical characteristics of the CI and the selected functional and physical characteristics designated for production acceptance testing and tests necessary for support of the CI.

1.53 Program Control Number (PCN). A unique number assigned to a change package and documented on all subsequent actions and documentation related to processing and implementing that engineering change. The PCN associates all related documentation and facilitates consolidation into a complete change package record.

1.54 Receipt Desk. In the context of CM, a group or person, within a Program/Project that serves as the centralized receipt location for submittal of change package data (e.g., change requests, control board directives, directive action closures, etc.) and associated documentation and who performs the first quality check that the change data and documentation meets Program/Project requirements.

1.55 Release. Authorization to disseminate for use or implementation approved information and/or products subject to configuration management.

1.56 Release Desk. See MSFC Release Desk.

1.57 Screening. The review of a proposed change to determine mandatory evaluators and CCB schedules. The Screening may be performed by one person or a Screening Group.

1.58 Secretariat. See CCB Secretariat.

1.59 Software. A combination of associated computer instructions and computer data definitions required to enable the computer hardware to perform computational or control functions.

1.60 Software Update. A change package containing necessary released documentation, software and instructions to install an approved engineering change into a delivered CSCI. A software update may be a patch or a complete revision to a CSCI.

1.61 Specification. A document which clearly and accurately describes essential technical and interface requirements for products and the criteria for determining whether those requirements are met.

1.62 System. A composite of equipment, skills, and techniques capable of performing and/or supporting an operational role. A complete system includes all equipment, related facilities, material, software, services, and personnel required for its operation and support to the degree that it can be considered a self-sufficient item in its intended operational environment.

1.63 Version. An initial release or re-release of a computer software configuration item, associated with a complete compilation or recompilation of the computer software configuration item.

1.64 Version Description Document (VDD). A document that accompanies and identifies a given version of a software system or component. Typical contents include an inventory of system or component parts, identification of changes incorporated into this version, instructions for compiling the software build, and installation and operating information unique to the version described.

1.65 Waiver. A written authorization to accept a configuration item, after manufacture, or after being submitted for Government inspection or acceptance, that is found to depart from specified requirement(s), with critical or major characteristics, but nevertheless is considered suitable for use "as is" or after repair by an approved method.

2. RESPONSIBILITIES

2.1 Program/Project Manager. The Program/Project Manager shall establish the requirements for a CM system that provides visibility and control of the functional and physical characteristics of a CI over the program/project life-cycle and ensure that that system is documented in a CMP. For procured CIs, the Program/Project Manager shall impose CM requirements in the contract and Data Procurement Document (DPD). In addition, the Program/Project Manager shall:

a. Charter a CCB and identify membership.
b. Approve the CMP.
c. Identify the CIs and CSCIs, and define in associated documentation.
d. Identify contract and in-house CM data requirements.
e. Ensure configuration documentation is baselined and controlled.
f. Establish successive configuration baselines throughout the program/project life-cycles.
g. Establish product traceability in accordance with MPR 8040.2.
h. Ensure configuration verification and audits are conducted.
i. Ensure proper identification and disposition of records.

2.2 Chief Engineer or Lead Systems Engineer. This person shall be responsible for ensuring the adequacy of inputs/outputs, technical specifications, and interface functions necessary to define the design-to requirements and that the detail design meeting development requirements are documented and verified. This person shall support the program/project manager in evaluating changes, deviations, and waivers. This person shall support the program/project manager in conducting reviews and audits.

2.3 Configuration Management (CM) Personnel. Configuration management personnel shall:

a. Assist the Program/Project Manager with establishing CM requirements in accordance with paragraph 3.1.
b. Define the implementation of those requirements in a CMP and format the plan in accordance with MWI 7120.4.

c. Ensure the CM system is implemented in accordance with the CMP.
d. Ensure a CCB Secretariat is assigned and configuration control procedures are established in accordance with paragraph 3.3.
e. Participate in technical reviews and audits.
f. Establish and maintain a configuration status accounting system that meets the requirements of paragraph 3.4.
g. Support configuration verification and FCA/PCAs in accordance with paragraph 3.5.
h. Plan and participate in CM audits in accordance with paragraph 3.5.3.
i. Identify, disposition, maintain CM records in accordance with paragraph 4.0.

2.4 Safety and Mission Assurance Directorate (S&MA). S&MA Directorate personnel shall be responsible for supporting the program/project to ensure that the quality assurance requirements for the product are in compliance with program/project requirements, and to support reviews and audits as required.

2.5 Responsible Design Organization. This organization shall ensure that the product design meets the Program/Project requirements and that the detail design has been documented in accordance with program/project requirements.

2.6 In-House Software Developing Organizations (SDO). The in-house SDO shall define software requirements and design in accordance with IEEE-EIA 12207, "Software Life-Cycle Processes," and shall submit documentation to the Program/Project CCB for control at Project specified milestones. The SDO shall maintain status of released software baseline versions and shall provide a VDD for each software product release to the Program/Project Manager after the software is placed under configuration control. The Program/Project and SDO shall determine when in the project lifecycle that the software product/VDDs are elevated from SDO control to Program/Project control.

2.7 Configuration Control Board (CCB) Chairperson. The CCB Chairperson shall:
a. Ensure that the CCB is chartered and membership established.
b. Preside at CCB meetings and direct how the CCB meetings are conducted.
c. Authorize all changes processed through the CCB.
d. Designate which CCB Members are required to concur-nonconcur on each change.

2.8 Configuration Control Board Members. CCB members shall:
a. Support the program/project in evaluating changes and provide impacts in their area.
b. Advise the CCB Chairperson on change disposition.
c. Concur or nonconcur on change disposition and implementation actions as required by the CCB Chairperson.

2.9 Configuration Control Board (CCB) Secretariat. The CCB Secretariat shall:
a. Ensure changes are received and accounted.
b. Ensure screening of changes for completeness and assignment to a CCB.
c. Ensure a CPE and evaluators are assigned to review data.

d. Schedule and monitor the control process to ensure that tasks are completed in a correct and timely manner.
e. Coordinate with the CPE to ensure CPE preparation of a recommended disposition for the CCB.
f. Act as Secretariat at CCB meetings, create CCB agendas and minutes.
g. Document the CCB disposition and implementation actions, obtain appropriate board member concurrence and board chairperson authorization.
h. Track Board actions and implementation actions to closure.
i. Ensure accounting and change package records are established and maintained.

NOTE: The Receipt Desk and Secretariat functions could be performed by one person or distributed between multiple people dependent on the size of the project or activity.

3. PROCEDURE

A CM program shall be implemented during the NPR 7120.5-defined formulation phase. The requirements for configuration identification, configuration control, configuration status accounting, and verification and audits as defined in this document shall be implemented for each program and/or project.

3.1	Program and/or Project Manager	CM Planning. Program/Project Manager shall provide direction for configuration management planning, and preparation and implementation of the CMP. The CMP shall address configuration identification, control, accounting, and verification. The unique requirements for the specific program and/or project shall be recorded in the CMP. See Appendix Z.0 for guidance on Project CMP and Appendix Z.1 for guidance on Software CM Plan content. The CMP shall be maintained current through the program and/or project life cycle. Contracts for configuration item development shall require a configuration management plan prepared in accordance with the requirements of MSFC-STD-3394.
3.2	Program and/or Project Manager, Systems Engineer, CM personnel, and responsible design organization	Configuration Identification. Program and/or Project Manager, Systems Engineer, CM personnel, and responsible design organizations shall implement Configuration Identification. Requirements for CIs and CSCIs shall be defined through the use of specifications (hardware and software), interface documentation (hardware and software), drawings, version description documents (VDDs) (software), and associated data. Documents shall be prepared as specified in MWI 7120.4. Configuration documentation for in-house-developed CI shall be released in accordance with MSFC-STD-555. Product identification and traceability for hardware,

firmware, and software shall be in accordance with MPR 8040.2 and MSFC-STD-555.

Configuration identification for CIs developed or maintained by a contractor(s) shall be in accordance with MSFC-STD-3394 and shall include requirements for a technical data package in accordance with the appropriate contract requirements. The data requirements description for specifications shall comply with MIL-STD-961. The drawing and parts list required for the configuration documentation shall comply with the requirements of ASME Y14.100.

3.2.1 Baseline Identification. MSFC program/project and design activities shall establish functional, allocated, and product baselines by baselining configuration documentation throughout the program/project lifecycle. Major technical reviews and audits (e.g., System Requirements Review, Preliminary Design Review, Critical Design Review, Functional Configuration Audit/Physical Configuration Audit) are typically used to ensure configuration documentation is correct and mature prior to baseline establishment.

3.2.2 Release. Release authority shall be assigned to one design activity for each item of configuration documentation. The design activity with release authority may be MSFC or a contractor. Contractor release shall meet the requirements of MSFC-STD-3394 or equivalent contract requirements.

The MSFC Release Desk shall be the single point of release for the MSFC design activity (CAGE Code 14981) and release shall be in accordance with MSFC-STD-555. There shall only be one active release record for each item of configuration documentation. For data previously released by another design activity, MSFC release shall only be allowed after official design activity transfer to MSFC. Configuration documentation for in-house-developed CIs shall be released in accordance with MSFC-STD-555. Technical approvals shall be obtained on configuration documentation prior to CCB authorization and MSFC Release Desk release in accordance with Appendix A. The Program/Project may document unique approval requirements in the Program/Project CM Plan in accordance with Appendix A.

All flight and qualification hardware and Ground Support

		Equipment (GSE) shall be fabricated to released drawings. Projects may submit a waiver to use unreleased drawings for fabrication but shall release the drawings prior to acceptance. The use of unreleased documentation that interfaces with Flight Hardware (Special Test, Manufacturing Processes and Handling Equipment) shall be identified in the CMP. The CMP shall also describe how this documentation is controlled.
3.3	Program and/or Project Manager, Systems Engineer, S&MA, CM personnel, and designated CCB members.	Configuration Control. Program and/or Project Manager, Systems Engineer, S&MA, CM personnel, and designated CCB member shall be responsible for configuration control. Configuration control shall begin with the establishment of initial configuration baselines and continues through the program and/or project life cycle. Requirements for in-house configuration control are defined in Appendix B. Contract requirements for configuration control shall be in accordance with MSFC-STD-3394 and the contract data requirements descriptions. Deviation and waiver requirements are defined in Appendix C.
3.3.1		Configuration Control Boards. Configuration Control Boards (CCBs) shall be instituted for the purpose of controlling and authorizing baselines, changes, deviations, and waivers to configuration documentation. The CCB Chairperson shall establish a CCB Charter and identify the CCB membership. At a minimum the membership shall include a Chairperson, Alternate Chairperson, Secretariat, S&MA and Procurement (if the CCB controls a contracted CI).
3.3.2		CCB Levels. A multilevel configuration control system shall be established when authority for management and development of CIs comprising a system is assigned to multiple organizations. The Program/Project Manager shall define the authority of each organization (CIs, configuration documentation, cost). Each organization that is authorized to control a CI baseline shall establish a CCB to establish configuration baselines and disposition changes, deviations, and waivers to those baselines. Lower-level CCBs shall prepare and process evaluations and prepare recommendations to higher-level CCBs for baselines established at these higher levels. The typical levels of control and authority are established as indicated below:

Level	Authority
I	NASA Headquarters
II	Program/Lead Center
III	Project Manager
IV	Project Manager or Systems Engineer V

The functions of the various CCB levels are summarized in Appendix Z.2.

3.3.3 Floor Engineering Orders and Floor Engineering Parts Lists (FEOs/FEPLs). Engineering orders (EOs) to released drawings-parts shall be processed in accordance with MSFC-STD-555. To allow MSFC manufacturing or test organizations to proceed without interruption, FEOs and FEPLs shall be processed in accordance with MWI 8040.5.

3.4 CM Personnel

Configuration Accounting. Configuration accounting shall consist of release and configuration status accounting. The lead CM personnel for MSFC programs/projects shall establish configuration accounting which meets the requirements of this MPR and program/project specific requirements. Contract requirements for configuration accounting shall be in accordance with MSFC-STD-3394.

MSFC release capability shall be provided through the MSFC Release Desk and meet the requirements of paragraph 3.2.2 and the requirements of this paragraph. The MSFC Release Desk utilizes the Integrated Configuration Management System (ICMS) for MSFC release which meets the requirements of this MPR. The MSFC Release System shall maintain current and historical release information for all CIs where MSFC is the design activity. Release actions shall cite the authority for the release (i.e., Control Board Directive). The engineering release system shall be capable of defining product attributes and shall be in such a format as to allow recovery and review to ensure an actual match with actual built units. Each release shall identify the data (documents/drawings/databases) released, the authorization for release, whether the release is an initial release or a change release, the configuration item or system affected (with effectivities), and date of release. The MSFC Release System shall capture and be capable of producing the following information:

a. The composition of any part number at any level in

terms of subordinate part numbers

b. All next higher or next assembly part numbers in which the part is used.
c. The CI number and effectivity on which any subordinate part is used

See Appendix Z.2 for guidance on data elements required for a release system.

CM Personnel shall be responsible for configuration status accounting. The Change Processing, Tracking, and Accounting System (CPTAS) may be used, or the Program/Project CM personnel may establish a system which meets the requirements of this MPR. Configuration status accounting shall:

a. Provide a complete record of approved configuration identification documentation for each CI
b. Record and report the status of proposed engineering changes from initiation to final approval and implementation
c. Record and report the status of all critical and major requests for deviations and waivers which affect the configuration of a CI
d. Record and report implementation status of authorized changes to each affected CI or data item
e. Provide the traceability of all changes from the original baseline configuration documentation of each CI/CSCI
f. Report the effectivity and installation status of configuration changes to all CIs at all locations
g. Accumulate and format data necessary to provide routine and special configuration accounting reports. CM status reports shall be generated and distributed as required by the project or design activity manager. Available information shall meet specific program and/or project needs.

See Appendix Z.2 for guidance on configuration status accounting system data elements.

3.5 Program and/or Project Manager, Systems Engineer, S&MA, and CM personnel

Configuration Verification and Audits. Program and/or Project Manager, Systems Engineer, S&MA, and CM personnel shall be responsible for configuration verification and audits. Configuration verification and audits shall utilize processes to verify that configuration items have been properly identified, approved, released and controlled throughout the

Program/Project life cycle and that the proper data has been maintained and reports generated to verify the configuration.

3.5.1 Configuration Verification. The Program/Project shall establish a closed loop system to verify that all actions associated with the approval of CI documentation have been tracked through closure.

3.5.2 Functional and Physical Configuration Audits (FCA/PCA). The Program/Project Manager shall direct that a FCA/PCA or equivalent review be performed prior to the delivery of a CI to verify that the CI's requirements have been met and that the CI's as-built configuration meets the as-designed configuration. Program/Projects may combine the FCA/PCA with other acceptance reviews as long as FCA/PCA objectives are met. A FCA/PCA Plan shall be developed by the MSFC project for an in-house FCA/PCA. For a FCA/PCA on a contracted CI, the plan shall be developed by the MSFC project or the contractor. Issues found during the FCA/PCA shall be documented and action items assigned (as needed) to address the issues and open work. A Certificate of Completion shall be documented and authorized by the FCA/PCA review leads. Appendix Z.3 provides guidance on FCA/PCA Plan preparation and conduct of the audit, and formats for Issues-Actions and the Certificate of Completion.

3.5.3 CM Audits. Each program and/or project office shall ensure that a minimum of one CM audit is performed for the managing activity and each design activity (i.e., those where MSFC has a direct contract or task agreement) that is developing critical or complex CIs. The CM audit shall assess the adequacy of the CM system in meeting MSFC requirements (in-house or contract) for configuration identification, control, accounting, and verification. CM audits are performed to reduce risk during development, production, and operations. For programs/projects that have increased complexity or criticality, the program/project shall assess the requirement for additional audits. Notification and planning for the CM Audit shall be provided to the audited organization prior to the audit. Discrepancies found during the audit shall be documented as Findings-Observations, or equivalent, and corrective action shall be assigned for each Finding. An Audit Report shall be produced after the audit that summarizes the conduct of the audit and the results. See Appendix Z.4 for

guidance on planning and conducting CM audits and suggested formats for documenting Findings-Observations and the Audit Report.

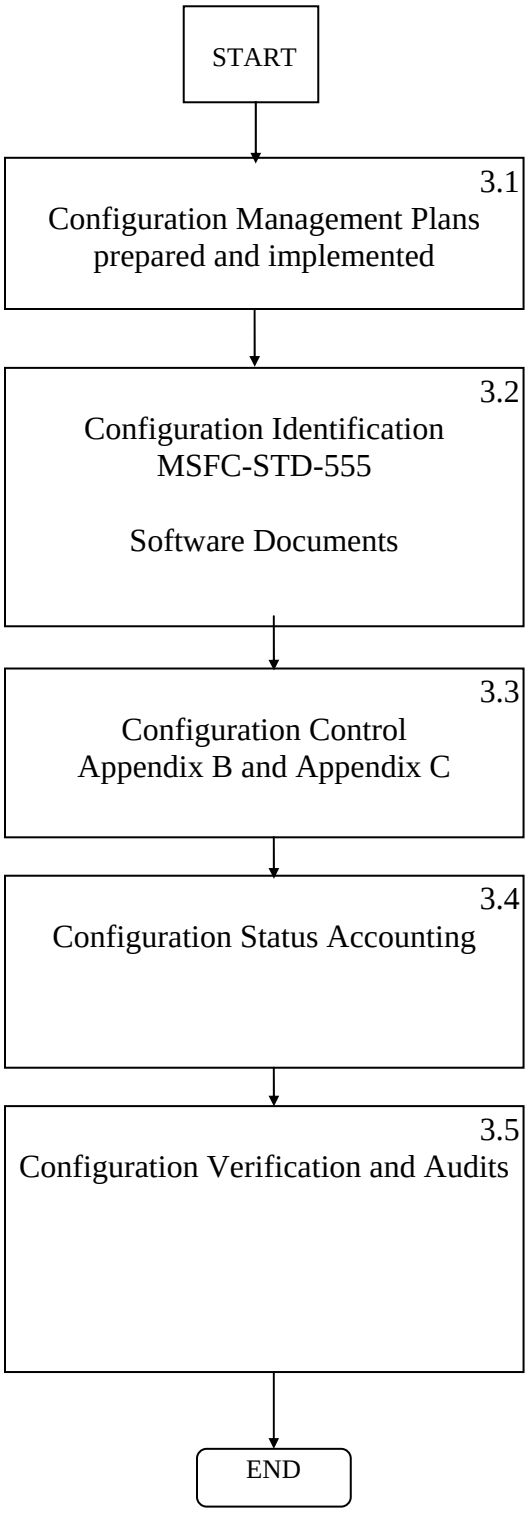
4. RECORDS

The records associated with the requirements of this MPR are listed in Table 1. Records and their retention schedules and disposition responsibility shall be identified in the Program/Project CM Plan in accordance with NPR 1441.1 and MPR 1440.2. Table 1 provides the records dispositions and suggested Records Custodian assignment.

TABLE 1: Configuration Management Records

Record Description	NPR 1441.1 Agency Filing Scheme (AFS) Number	NPR 1441.1 Schedule/Item Number	Record Custodian (typical)
CCB Charter Memoranda	8000	Schedule 8/Item 4	Project Management Support Assistant
Configuration Documentation released by the MSFC Release Desk (specifications, drawings, other project data)	8000	Schedule 8/Item 5.A.1	MSFC Repository (as required by MPR 2210.1)
Other Project Documentation authorized through a CCB	8000	Schedule 8/Item 5.A.1	Project Manager designee (MSFC Repository is recommended)
Configuration Control Board/Program Control Number (PCN) Files	8040	Schedule 8, Item 9.A	Project CCB Secretariat or designee
Configuration Control Board Agendas and Minutes	8040	Schedule 8, Item 9.A	Project CCB Secretariat or designee
CM Audit Plan (or planning materials), Audit Report, Findings/Observations and Closures	1280	Schedule 1, Item 26.5	Project CM Personnel or designee
FCA/PCA Plan, Issues/Action Items and Closures, Certificate of Completion	8000	Schedule 8, Item 5.A.1 (Review Files)	Project CM Personnel or designee
CM Accounting Reports and Data	8040	Schedule 8, Item 9.A	Project CCB Secretariat or designee

5. FLOW DIAGRAM



APPENDIX A. Configuration Documentation Approvals Prior to CCB Authorization and MSFC Release

The approvals defined in Table 2 shall be obtained on MSFC configuration documentation prior to submittal to the Program/Project CCB for authorization and release through the MSFC Release Desk. The Program/Project may establish a Program/Project unique approval scheme for configuration documentation that alters the approvals defined in Table 2. The Program/Project unique matrix shall be documented in the Program/Project CM Plan with justification for altering these approval requirements.

TABLE 2: CONFIGURATION DOCUMENTATION APPROVALS PRIOR TO CCB AUTHORIZATION AND RELEASE
(applies to documentation released through the MSFC Release Desk)

Document Type	Drawing Checking	Manufacturing-Producibility	Quality-Inspectability	Stress	Materials	Design
Specification/Interface Control Document (ICD)	x					
New Drawing	x	x	x	x	x	x
Drawing Revision	x			x	x	x
Drawing Revision (incorporating previously approved EOs)	x					x
Schematic	x		x			x
Engineering Parts List (EPL)	x			x	x	x
Engineering Order (EO)	x			x	x	x
Floor EO/EPL		x				x
Engineering Parts List Revision	x					x
New Non-Parts Drawing	x					x
Records Correction EO/EPL	x					x

The names of the personnel authorized to sign/approve for each function shall be identified by the Program/Project to the CCB Secretariat and documented in a memorandum or other document that is approved by the Project Manager. The CCB Secretariat shall verify that the appropriate functions and personnel have authorized the design data prior to CCB Chairperson authorization.

If the Chief Engineer determines that an approval is not required for a specific configuration document, the Chief Engineer shall have the authority to waive the approval by marking “not applicable” with initials and date.

APPENDIX B. Configuration Control Requirements

B.1 This appendix provides requirements, responsibilities, and instructions for Program/Project, Systems Engineering, Safety and Mission Assurance (S&MA), and Configuration and Data Management personnel for the control of hardware, firmware, and software configuration documentation for which Marshall Space Flight Center (MSFC) has responsibility

B.2 This appendix contains detailed instructions to: (1) Establish configuration control boards; (2) Establish baselines and process changes, deviations, and waivers to those baselines; (3) Administer the CCB and track CCB actions to ensure that CCB decisions are disseminated for implementation; and (4) Follow up for closeout of all required actions.

B.3 CM personnel shall establish and maintain CCB change package files, also called Program Control Number (PCN) files. The elements of the change package shall be filed in chronological order within the change package file. If filed electronically, the change package elements shall be sortable or reportable chronologically. As a minimum, the following information shall be included:

a. The change, ECR, Engineering Change Proposal (ECP), CR, DAR, etc.
b. Control Board Directive (CBD) or change evaluation (CE), whichever is appropriate
c. Mandatory evaluator evaluations, if any
d. Minutes of CCB meetings and actions assigned
e. Implementation closure data

B.4 CCB Secretariat shall assure a unique change package number, or "PCN" number, is assigned to each change package. If utilizing the MSFC Release Desk/Integrated Configuration Management System (ICMS) or the Change Processing, Tracking, and Accounting System (CPTAS), the PCN number shall be assigned in accordance with the following format: *XX00001* where **"***XX*" indicates the program designator (PD) that is assigned by MSFC Release Desk (The PD is a code designating a portion of the database for specific a program/project within ICMS and CPTAS) and **"***00001***"** is a five-character numeric sequence number (assign the next number one increment from the previous number assignment).

B.5 The CCB Charter and membership shall be established as required in paragraph 3.3.2. The CCB Secretariat shall reserve appropriate codes from the MSFC Release Desk (Project Designator (PD) code, board code, effectivity code) and shall document this information on an effectivity sheet, MSFC Form 4341 or equivalent.

B.6 through B.12 Change Processing

B.6 The need for a change shall be identified, through the CCB, to the office of primary responsibility via a CR, ECR, ECP or DAR. For changes to an ICD, the changes shall be documented on a MSFC Form 4229, Interface Revision Notice (IRN)/Preliminary Interface

Revision Notice (PIRN), or equivalent, and attached to the CR or ECR. See MSFC-STD-555 for IRN/PIRN processing instructions.

B.6.1 For MSFC-initiated changes, the change shall be submitted to the Receipt Desk or CCB Secretariat associated with the CCB that has authority over the CI-documentation being changed. For changes originated by a contractor, the official change submittal is to the Government Contracting Officer (C.O.), though it is recommended that the contractor provide a copy to the CCB Secretariat in parallel to the C.O. to expedite processing. The CR/ECR shall be documented on a MSFC Form 2327 (ECR) or MSFC Form 2348 (ECP) or shall contain the following minimum information:

a. CR Number
b. CR Revision-Version
c. Creation Date
d. CR Title
e. Change Package Number/PCN
f. Originator Name
g. CAGE Code (required for contractor or external agreement)
h. Originator Organization/Org. Code
i. Contract or Agreement Number (required for contractor or external agreement)
j. Recommended priority (Routine, Urgent or Emergency)
k. Change Description
l. Impacts (Cost, Schedule, Technical)
m. Justification or Reason for Change
n. Affected documents
o. Effectivity
p. Affected CI (s)

B.6.2 The following information is not required, but is recommended to be included:

q. Approval need date
r. Originator E-mail/Phone
s. ACI Restrictions
t. Change type (Hardware, Software, or Documentation)
u. Consequences if not incorporated

B.6.3 Deviations and waivers shall be documented as a DAR in accordance with Appendix C.

B.7 CM personnel shall enter the change status and accounting data into CPTAS or a program/project approved tracking system .

B.8 The screening function, composed of one or more project personnel, shall review the change to identify mandatory evaluators and to recommend a CCB schedule.

B.9 CM personnel shall notify CCB members and evaluators. Minimum information provided with the notification shall include:

a. The change, or change identification and access location
b. Designated Change Package Engineer (CPE)
c. Date evaluations shall be required
d. Distribution list
e. Planned CCB date (recommended, not mandatory)

B.10 The evaluators shall complete their evaluation on MSFC Form 516 or project-specified format and submit it to the CCB Secretariat and CPE within the specified schedule.

B.11 The CPE shall perform the following:
a. Consolidate all technical and programmatic evaluations.
b. Formulate a recommendation for the CCB.
c. Forward CCB recommendation to CCB secretariat for draft CBD.
d. Prepare CCB presentation in accordance with Program/Project requirements.

B.12 The CCB Secretariat shall prepare and distribute a CCB agenda with the following minimum information:
a. CCB date and location
b. Listing of changes to be presented to the CCB by change number, title and effectivity
c. CPE for each change.
d. A listing of outstanding actions scheduled for the CCB meeting

NOTE: CCB Chairpersons may disposition changes outside the CCB, but it is highly recommended that CCB be held to identify and resolve all issue with a change.

<u>B.13 through B.19 CCB Operations</u>

B.13 The CPE shall present the change to the CCB.

B.14 The CCB Chairperson shall disposition (approved, approved with changes or disapproved) the change on a CBD or CCB CE (for submission to a higher level CCB). The CCB Chairperson shall designate which CCB members are required to concur-nonconcur on each CBD; the CCB Chairperson may disposition the change without any CCB member concurrence-nonconcurrence if they choose. The CBD shall be documented on MSFC Form 2312 or on a Program/Project controlled format that contains the following minimum information:
a. CBD Number
b. Change request number
c. Change Package Number/PCN
d. Date dispositioned
e. CBD Version
f. CCB dispositioning the change
g. For subsequent version of a CBD, indicate whether the CBD supplements or supercedes the previous version.
h. Related CBDs (optional)

i. Disposition
j. CCB member concurrence/non-concurrence. Non-concurrence rationale shall be documented.
k. Affected CIs
l. Effectivity
m. All CCB actions, actionees and suspense dates needed to implement the change.

NOTE: for contracted CIs, an action item shall be assigned to the Government Contracting Officer to incorporate the change into the contract.

B.15 CCB members shall indicate their concurrence/non-concurrence on the CBD or CCB CE. Non-concurrences shall include rationale. NOTE: If the CBD or CCB CE cannot be completed during the CCB, the CCB secretariat shall complete and route after the CCB.

B.16 The CCB secretariat shall retain the official change package and the original CBD or CCB CE.

B.17 The CCB secretariat shall prepare and distribute minutes of each CCB meeting with the following minimum information:
a. Date and location
b. List of attendees
c. List of agenda items and their disposition
d. Non-CBD action items assigned during the CCB, including actionee and suspense date.

B.18 The CBD actionees shall implement CBD actions and provide closure data to the CCB.

B.19 CCB secretariat shall monitor closure actions and provide action item status to the CCB Chairperson.

<u>B.20 through B.25 Field Engineering Changes (FEC)</u>

B.20 The Using Site Activity shall identify the need for a FEC and the proposed implementation. The FEC shall be pre-coordinated with the MSFC onsite representative or the MSFC Program/Project office.

B.21 The MSFC Using Site shall generate the FEC to contain the minimum data list in B.21.1 and transmit the FEC to the Program/Project office for concurrence. The Program/Project office shall provide concurrence/non-concurrence to the Using Site Activity

B.21.1 Minimum FEC Data:
a. FEC No.
b. Version or Revision
c. PCN
d. Problem Report No.
e. Initiation Date

f. Change Title
g. Top Assembly Number and Nomenclature
h. Part Number(s) Affected
i. Serial Number/Lot Number
j. Effectivity
k. Change Justification

B.22 If MSFC is the design activity, then the office of primary responsibility shall prepare a change request for baselined design changes. If the design activity is a contracted effort, then the contractor shall implement an ECP in accordance with MSFC-STD-3394 for each FEC.

B.23 The Using Site shall implement the FEC. The Using Site CM system shall be responsible for tracking, statusing, providing closure and maintaining records for the FEC.

B.24 The Using Site shall notify and provide the MSFC CCB secretariat of FEC installation and verification data to be filed into the change package/PCN file.

B.25 The CCB secretariat shall notify the Using Site of design baseline updates and provide updated design data to the Using Site.

B.26 through B.33 Modification Kits

B.26 The Using Site or Design organizations shall identify the need for retrofit after receipt/delivery of a CI.

B.27 Design activity shall generate a change request to describe the change to baseline documentation required by the retrofit.

B.28 After change request approval (in-house), the design activity shall generate a mod kit documentation package including a mod kit parts list, installation instructions and validation requirements. For contractor modifications, the mod kit documentation package shall be included with the ECP, in accordance with MSFC-STD-3394.

B.29 Mod kit instructions, for in-house design activity, shall include the following:
a. Title
b. Mod kit instruction number
c. Authorization
d. Creation date
e. Mod kit proofed
f. Where work is to be performed
g. Installation sequence
h. Spares affected
i. Manuals affected
j. Safety considerations

k. Purpose of the mod instruction
l. Effectivity
m. Parts/material documentation required
n. Instructions for accomplishing the mod
o. Nameplate
p. Special packaging and handling instructions
q. Special tools, safety equipment, or test equipment
r. Disposition of removed parts
s. Estimated man-hours required
t. Verification/validation requirements
u. Prepared by
v. Inspected by
w. Software requirements

For contracted CIs the mod kit instructions shall be in accordance with contract requirements. NOTE: a copy of the mod kit instructions shall be provided for each serialized CI.

B.30 The design activity shall ship mod kit (software and hardware) and documentation package. Shipment shortages shall be rectified by partial mod kit shipments as required.

B.31 The Using Site activity shall implement retrofit/modification in accordance with mod kit instructions.

B.32 The Using Site shall complete the kit installation and verification information and forward to the Program/Project office. This information may be recorded on an Installation Notice Card, MSFC Form 2490. Using Site format is acceptable but shall contain the data items listed as follows:
a. Mod kit number
b. CR/ECP number that authorized the modification
c. Part number modified or the new part identification if the mod caused a part number change
d. Date and location of installation
e. Serial number of the item
f. Work order number, if applicable
g. Name, address and telephone number of the person responsible for the installation
h. Date and location of the verification
i. Name, address and telephone number of the person responsible for the verification
j. Name, address and telephone number of the Government inspector
k. Any additional remarks to clarify the installation/verification

B.33 The CCB secretariat shall receive the mod kit installation and verification information. The CCB secretariat shall be responsible to incorporate this information into the approved accounting system/CPTAS and the Change Package/PCN files.

B.34 through B.41 Software Update Instructions

B.34 The Using Site or Design organizations shall identify the need for software update after receipt/delivery of a CSCI.

B.35 Design activity shall generate a change request to describe the change to baseline documentation required by the software update.

B.36 After change request approval (in-house), the design activity shall generate a software update documentation package including a software Version Description Document. For contractor software update, the software update documentation package shall be in accordance with the contract requirements.

B.37 The software update package, for in-house design activity, shall include the following:
a. Title
b. Software version number
c. Authorization
d. Creation date
e. Installation site
f. Installation sequence
g. Operational manuals affected
h. Safety considerations
i. Purpose of the software update
j. Effectivity
k. Documentation required
l. Instructions for installation
m. Special test equipment
n. Estimated man-hours required
o. Validation requirements
p. Installed by
q. Tested by
r. Software requirements

NOTE: A copy of the software update package shall be provided for each serialized CSCI.

B.38 The design activity shall ship software update and documentation package. Shipment shortages shall be rectified by partial mod kit shipments as required.

B.39 The Using Site activity shall implement the software update in accordance with the instructions.

B.40 The Using Site shall complete the kit installation and verification information and forward to the Program/Project office. This information may be recorded on an Installation Notice Card, MSFC Form 2490. Using-site format is acceptable but shall contain the data items listed as

follows:
a. Software version number
b. CR/ECP number that authorized the software update
c. Date and location of software update installation
d. Work order number, if applicable
e. Serial number of the item
f. Name, address and telephone number of the person responsible for the installation
g. Date and location of the verification
h. Name, address and telephone number of the person responsible for the verification
i. Any additional remarks to clarify the installation/verification

B.41 The CCB secretariat shall receive the software update installation and verification information. The CCB secretariat shall be responsible to incorporate this information into the approved accounting system/CPTAS and the Change Package/PCN files.

APPENDIX C. Deviations/Waivers Requirements

C.1 This Appendix establishes the method for generating, processing, and implementing deviations and waivers to specified requirements for MSFC Program or Project hardware or software configuration items.

C.2 The Program /Project management shall control departures from Configuration Item baseline requirements, which affects critical or major characteristics, as a Deviation/Waiver Approval Request (DAR). NOTE: Departure from CI baseline requirements which affect minor characteristics are processed by MSFC Material Review Boards in accordance with MWI 8730.3. DARs shall be documented on a MSFC Form 847 or on a Program/Project format which contains the following minimum information:

a. DAR Number
b. Version
c. Creation Date
d. Originator Name/E-mail/Phone
e. Change Package Number
f. Contract or Agreement Number
g. Part Number/Document Number Affected
h. Part/Document Name-Description
i. DAR Title
j. Serial Number/Lot Number
k. Quantity
l. CI
m. Effectivity
n. Specified Requirement
o. Description of Departure from Requirement
p. Justification
q. Documents Affected
r. Cost/Schedule Impacts

C.3 The initiator shall identify the need for a Deviation/Waiver and document it on a DAR form or Program/Project format.

C.4 The Program/Project shall review the DAR for completeness and submit it to the change control process in accordance with Appendix B.

C.5 For in-house Programs/Projects, S&MA shall verify the approved DAR is incorporated into the CI's as built configuration records.

C.6 For contracted CIs, the contracting officer shall implement the approved DAR into the appropriate contract.

APPENDIX Z.0. Guidance for Configuration Management Plan

The Program/Project Configuration Management Plan (CMP) should be prepared in accordance with the format requirements of MWI 7120.4 with the contents defined below. The CMP template should be used. For small programs/projects, the CMP may be combined with the project plan or other appropriate program/project document as long as the following contents are included. While maintaining compliance with MSFC's policies and procedures, the plan may be tailored to define the unique requirements of the program or project. Sections not applicable to a specific program or project should be addressed as "Not applicable."

Z.0.1 Title Page. Complete the title page in accordance with MWI 7120.4, except document title should be CONFIGURATION MANAGEMENT PLAN, FOR (Enter Program or Project name).

Z.0.2 Signature Page (For Non-electronic Documents). This page contains: (1) document number; (2) document title; (3) effective date; and (4) approval signature(s).

Z.0.3 Document History Log. The Document History Log is completed in accordance with MWI 7120.4.

Z.0.4 Table of Contents. The Table of Contents lists the title and page number of all paragraphs, subparagraphs, figures, tables, and appendices, in that order.

Z.0.5 Section 1: Purpose or Scope. This section includes:

Z.0.5.1 The purpose, scope, and specific program/project applicability of the CMP and the program phase(s) to which it applies.

Z.0.5.2 A brief description of the system or top-level CI, and of the component lower-level CIs, using approved CI descriptions to which the CMP pertains.

Z.0.5.3 Reference to related documents (i.e., CMPs of suppliers, contractors, etc., which have close connections to the relevant CMP).

Z.0.5.4 A schedule to provide guidance on the timeline of important CM activities.

Z.0.6 Section 2: Applicable Documents. This section lists the specifications, standards, manuals, and other documents, including policy directives, specified in the plan by title, document number, revision, and, when applicable, change notice, amendment number, and date of issue. This section may provide definitions, glossaries, and acronym listing if necessary for plan clarification.

Z.0.7 Section 3: Organization. This section describes and graphically portrays the program/project organization with emphasis on the CM activities, which includes:

Z.0.7.1 Relationships and integration of the program/project organization and functional organizations.

Z.0.7.2 Responsibility and authority for CM and all participating groups and organizations, including their role in CCBs and the integration of CM functions with other program activities such as technical reviews.

Z.0.7.3 Interfaces between the program/project, other programs/projects, other Centers, and applicable contractors.

Z.0.8 Section 4: Configuration Management Phasing and Milestones. This section describes and graphically portrays the sequence of events and milestones for implementation of CM in phase with major program/project milestones and events, including as a minimum:

Z.0.8.1 Release and submittal of configuration documentation in relation to program events (technical reviews, audits, etc.).

Z.0.8.2 Establishment of internal developmental configuration and contractual baselines.

Z.0.8.3 Implementation of configuration control.

Z.0.8.4 Establishment of CCBs. The specific authorized boards and their membership.

Z.0.8.5 Implementation of the status accounting information system and provision of reports, or access to the status accounting information.

Z.0.8.6 Conduct of configuration audits.

Z.0.9 Section 5: Configuration Data Management. This section describes the methods for meeting the configuration management technical data requirements under the computer-aided transmission and distribution requirements for the program/project. The following lists some, but not necessarily all, of the areas to be considered when addressing this subject in the CMP:

Z.0.9.1 The plan addresses how the configuration management identification data is delivered, verified, stored, and maintained.

Z.0.9.2 How the data is processed and the type of records, hard copy or digital, should be stated.

Z.0.9.3 How limited rights information is protected.

Z.0.9.4 How the changes is transmitted.

Z.0.9.5 Method of notification/acknowledgment of receipt, return, or acceptance.

Z.0.9.6 Indication of time constraints, if any, for automatic data acceptance.

Z.0.9.7 Data status accounting.

Z.0.9.8 How data is accessed.

Z.0.9.9 Methods of indicating acceptance, provisional acceptance, approval, or rejection, as applicable.

Z.0.10 Section 6: Configuration Identification. This section describes the procedures and requirements for establishing and maintaining identification of hardware, software, firmware, and related interfaces during the life of the project and/or CI(s). Address the following as appropriate for the specific program/project/CI:

Z.0.10.1 Selection of CIs (HWCIs and CSCIs).

Z.0.10.2 Establishment and management of configuration including document, drawing, and software development libraries.

Z.0.10.3 Establishment of the configuration baselines (Functional, Development, and Product) and definition of the configuration documentation required for each, including graphic illustration of configuration documentation relationships.

Z.0.10.4 Correlation of manufactured or procured products.

Z.0.10.5 Assignment and application of configuration identifiers including document numbers, description, serial numbers and part number to hardware; and software identifiers for software and firmware.

Z.0.11 Section 7: Interface Management. This section describes the procedures for identification of interface requirements, establishment of interface agreements, and participation in Interface Control Working Groups (ICWGs).

Z.0.12 Section 8: Configuration Control. This section describes the program/project procedures for meeting MSFC policies for CM control. Address the following as applicable for the specific CIs:

Z.0.12.1 Functions, responsibility, and authority of the configuration control boards.

Z.0.12.2 Classification of changes and the level of authority for change approval/concurrence.

Z.0.12.3 Processing of changes (DARs, ECPs, ECRs, PIRNs, etc.).

Z.0.12.4 Processing of nonconforming products. Material Review Board authority should be addressed.

Z.0.12.5 Processing Specification Change Notices (SCNs).

Z.0.12.6 Identification of the membership for each authorized Configuration Control Board.

Z.0.12.7 Include the matrix required by Appendix A, Table 2.

Z.0.12.8 Identify procedures for the control of changes prior to the establishment of a formal configuration baseline.

Z.0.12.9 Identify procedures for processing changes from initiation through validation of the change after implementation into the CI.

Z.0.12.10 If a waiver has been granted for the project according to Appendix C, specify the details of how unreleased drawings used for fabrication are identified/controlled and how changes thereto are processed, including tracking and status accounting.

Z.0.13 Section 9: Configuration Status Accounting. This section describes procedures for meeting MSFC and program/project requirements including the following, as applicable:

Z.0.13.1 The method for collecting, recording, processing, and maintaining data necessary to provide the status accounting information via reports and/or data base access.

Z.0.13.2 Description of reports information system content related to, as applicable:

a. Identification of current approved configuration documentation and configuration identifiers associated with each CI.

b. Status of proposed engineering changes from initiation to implementation.

c. Results of configuration audit; status and disposition of discrepancies.

d. DAR status.

e. Traceability of changes to released document through implementation.

f. Effectivity and installation status of configuration changes to all CIs at all locations.

Z.0.13.3 Methods of access to information in status accounting systems and/or frequency of reporting and distribution.

Z.0.14 Section 10: Functional and Physical Configuration Audits and CM Audits. This section

describes the program/project planned action for CM audits. The following is addressed:

Z.0.14.1 Plans, procedures, documentation, and schedules for functional and physical configuration audits.

Z.0.14.2 Plans, procedures, and schedules for conducting CM program audits and reporting results.

Z.0.14.3 Plans, procedures, and schedules for reviews necessary for the establishment of functional and development baselines.

Z.0.14.4 Description of the format for audit reports.

Z.0.14.5 Description of the method for tracking status and disposition of discrepancies.

Z.0.15 Section 11: Contractor/Vendor Control. This section describes the methods used to ensure contractor/vendor compliance with the configuration management requirements for the program/project.

Z.0.16 Section 12: Records. This section includes information as specified by the program/project office in accordance with MPR 1440.2.

APPENDIX Z.1. Guidance for Software CM Plan

The Program/Project Software Configuration Management (SCM) Plan should be prepared in accordance with the template and contents defined below. This template was derived from IEEE-828, Standard for Software Configuration Management Plans, and is intended for use by in-house-developed software development projects. While maintaining compliance with MSFC's policies and procedures, the plan is tailored to define the unique requirements of the program or project. Sections not applicable to a specific program or project should be addressed as "Not applicable."

Z.1.1 Title Page.

Z.1.2 Signature Page (For Non-electronic Documents). This page contains: (1) document number; (2) document title; (3) effective date; and (4) approval signature(s).

Z.1.3 Document History Log.

Z.1.4 Table of Contents. The Table of Contents lists the title and page number of all paragraphs, subparagraphs, figures, tables, and appendices, in that order.

Z.1.5 Section 1: Introduction. Introduction information provides a simplified overview of the SCM activities so that those approving, those performing, and those interacting with SCM can obtain a clear understanding of the SCM Plan.

Z.1.5.1 Purpose. The purpose briefly addresses why the SCM Plan exists and who the intended audience is.

Z.1.5.2 Scope. The scope addresses SCM applicability, limitations, and assumptions on which the SCM Plan is based.

Z.1.5.3 Definitions. This section contains definitions of key terms in order to establish a common terminology among all users of the SCM Plan.

Z.1.5.4 References. This section lists the specifications, standards, manuals, and other documents, including policy directives, specified in the plan by title, document number, revision, and, when applicable, change notice, amendment number, and date of issue. This section may provide definitions, glossaries, and acronym listing if necessary for plan clarification.

Z.1.6 Section 2: SCM Management. SCM management information describes the allocation of responsibilities and authorities for SCM activities to organizations and individuals within the project structure.

Z.1.6.1 Organization. Describe all organizations that participate in or are responsible for any SCM activity on the project, the functional roles of these organizations within the project

structure, and the relationships between the organizations.

Z.1.6.2 SCM Responsibilities. Specify the allocation of SCM activities to specific organizations. For each activity listed within SCM Activities, provide the name of the organization or job title to perform this activity.

Z.1.7 Section 3: Configuration Data Management. This section describes the methods for meeting the configuration management technical data requirements under the computer-aided transmission and distribution requirements for the program/project. The following lists some, but not necessarily all, of the areas to be considered when addressing this subject in the SCM Plan:

Z.1.7.1 Data Management. Address how the configuration management identification data is managed and processed. This includes information concerning the type(s) of data records, and how the data is accessed and updated or changed.

Z.1.7.2 Data Status Accounting. Address data status accounting.

Z.1.8 Section 4: Software Configuration Management Activities. SCM activities information identifies all functions and tasks required to manage the configuration of the software system as specified in the scope of the SCM Plan. Identify both technical and managerial SCM activities.

Z.1.8.1 Configuration Identification. This section describes the procedures and requirements for establishing and maintaining identification of software, firmware, and related interfaces during the life of the project and/or CSCI(s). This section describes the documented physical and functional characteristics of the code, specifications, design, and data elements to be controlled for the project. In addition, identify the CSCI(s), as well as their structures at each project control point or milestone.

Z.1.8.2 Identifying Configuration Items. The SCM Plan records the items to be controlled, the project CSCI(s) and their definitions as they are baselined and approved.

Z.1.8.3 Naming Configuration Items. The SCM Plan specifies an identification system for assigning unique identifiers to each software item to be controlled. It also specifies how different versions and/or baselines of each are to be uniquely identified.

Z.1.8.4 Acquiring Configuration Items. The SCM Plan identifies the controlled software libraries for the project and describes how the code, documentation, and data of the identified baselines are to be physically placed under control in the appropriate library. For each library, specify the format, location, documentation requirements, receiving and inspection requirements, and access control procedures.

Z.1.9 Configuration Control. Configuration control activities request, evaluate, approve or disapprove, and implement changes to baselined CSCI(s). Changes include both error correction

and enhancement.

Z.1.9.1 Requesting Changes. The SCM Plan specifies the procedures for requesting a change to a baselined CSCI and the information to be documented for the request.

Z.1.9.2 Evaluating Changes. The SCM Plan specifies the analysis required to determine the impact of the proposed change and the procedures for reviewing the results of the analysis. Changes should be evaluated according to their effect on the deliverables based on approved requirements and their impact on project resources.

Z.1.9.3 Approving or Disapproving Changes. The SCM Plan identifies each configuration control board (CCB) and its level of authority for approving proposed changes.

Z.1.9.4 Implementing Changes. The SCM Plan specifies the activities for verifying and implementing an approved change.

Z.1.9.5 Configuration Status Accounting. Configuration status accounting activities reflect status of all current approved project CSCI(s). The SCM Plan includes:

a. What data elements are to be tracked and reported for baselines and changes as specified in MPR 8040.1, section 3.4;
b. What types of status accounting reports are to be generated and their frequency;
c. How information is to be collected, stored, processed, and reported;
d. How access to the status data is to be controlled.

If an automated system is used for any status accounting activity, its functions should be described or referenced.

Z.1.9.6 Configuration Audits and Reviews. The SCM Plan identifies the configuration audits and reviews to be held for the project.

Z.1.9.7 Interface Control. This section describes the procedures for identification of interface requirements, establishment of interface agreements and Interface Control Documents (ICDs), and participation in Interface Control Working Groups (ICWGs).

Z.1.10 Subcontractor/Vendor Control. The SCM Plan defines the activities to manage and control the incorporation of externally developed items into the project CSCI(s) and to coordinate approved changes to these items with their development organizations for both subcontracted and acquired software.

Z.1.11 Section 5. SCM Schedule. The SCM schedule provides guidance on the timeline of important SCM activities.

Z.1.12 Section 6. SCM Resources. SCM resource information identifies the software tools, techniques, equipment, resources and training necessary for the implementation of the specified SCM activities.

Z.1.13 Section 7. SCM Plan Maintenance. The maintenance information identifies the activities and responsibilities necessary to ensure continued SCM planning during the life cycle of the project.

Z.1.14 Section 8: Records. This section includes information as specified by the program/project office in accordance with MPR 1440.2.

APPENDIX Z.2. Guidance on Configuration Control and Configuration Accounting

	See Related Paragraph in Main Body	
Z.2.1	3.3	Level I CCB. The Level I CCB is established by authority of the NASA Headquarters Program Associate Administrator and chaired by the NASA Headquarters Program Associate Administrator or designee. This CCB is the controlling authority of all baselines and changes to the Level I program requirements. Functions, duties, and membership of the Level I CCB are established by the NASA Headquarters Program Associate Administrator. Level I CCB support at MSFC is through the appropriate lower-level CCBs.
Z.2.2	3.3	Level II CCB Outside MSFC. When another NASA Center is designated as the Lead Center for a program with elements at various Centers, including MSFC, the Lead Center Program Manager establishes a Level II CCB. MSFC support of Level II CCBs residing at locations other than MSFC is executed through the appropriate Level III CCB.
Z.2.3	3.3	Level II CCB at MSFC. When MSFC is designated as the Lead Center for a program with elements at various NASA Centers, the Level II CCB is established at MSFC. The MSFC Level II CCB is the authority for establishing configuration baselines and changes to these configuration baselines. The Level II CCB submits all actions affecting Level I requirements to the Level I CCB with a recommended disposition.
Z.2.4	3.3	Level III CCB. Managers for project offices establish Level III CCBs to establish configuration baselines and control changes to these baselines. Level III CCBs submit all changes affecting Level I or Level II requirements to the Level II CCB with a recommended disposition. Level III reviews Level II CRs and submits a consolidated CE to Level II.
Z.2.5	3.3	Level IV CCB. Managers for Project Offices authorize the establishment of a Level IV CCB, if necessary, designates the Chair, and identifies the baseline level to be controlled by the Level IV CCB. Level IV submits all changes affecting Levels I, II, or III requirements to the Level III CCB with a recommended disposition. The Level IV CCB reviews Level II and III CRs, ECRs, and ECPs and submits a consolidated change evaluation to Level III.

See Related Paragraph in Main Body

Z.2.6 3.3 Change Criteria. Changes, deviations, and waivers are limited to those which offer significant benefit and meet one or more of the following:

a. Correct safety, design, and performance deficiencies.

b. Satisfy change in operational or support requirements.

c. Effect overall cost savings.

d. Prevent or control program/project slippage.

e. Implement design improvements.

f. Implement performance requirement changes.

g. Establish or maintain interface compatibility.

Z.2.7 3.3 Change Priority. Change priorities are assigned by the change initiator, with a proposed priority of **emergency**, **urgent**, or **routine** in accordance with the following criteria:

a. Emergency. The change initiator assigns this priority if the proposed change is to correct a safety condition that could result in fatal or serious injury to personnel or in extensive damage to, or destruction of, equipment.

b. Urgent. The change initiator assigns this priority if the proposed change is to correct a potentially hazardous condition which, if uncorrected, could result in injury to personnel or in damage to equipment and reduction of mission effectiveness. A potentially hazardous condition that compromises safety and embodies risk, but within reasonable limits, permits continued use of the affected item provided the operator has been informed of the hazard and appropriate precautions have been defined and distributed to the user. This priority should also be used for the following:

(1) Changes necessary to meet schedules when longer lead time would necessitate slipping baselined production, activation, or construction schedules.

See Related Paragraph in Main Body

(2) Mission capability changes when delay would compromise the mission capability and result in unacceptable contract, production, or mission launch schedules.

(3) Changes associated with interface problems resulting from compatibility changes made by other design activities or contractors.

c. Routine. The change initiator assigns this priority to a proposed change when *Emergency* or *Urgent* is not applicable.

The priority determines the relative timeframe in which the changes are to be dispositioned by MSFC. Maximum MSFC processing times allocated from initial submission to the CCB Secretariat through CBD disposition are as follows:

Priority	Process Time
Emergency	< 48 hours
Urgent	14 calendar days
Routine	28 calendar days

Z.2.8 3.4 Integrated Configuration Management System (ICMS). ICMS provides data on the release status of configuration documentation and configuration documentation changes, and maintains the parts list information which captures the detailed "as-designed" configuration for a configuration item. Drawings, EPLs, EOs, specifications, and DRLs are prepared for engineering release to implement original or changed configuration documentation. MSFC design activities follow the drawing release requirements of MSFC-STD-555.

Z.2.9 3.4 Guidance on Data Elements to be Included in a Release System

Elements of Data for Hardware Items

Release records for hardware items should contain the following information.

CI Elements

a. Item number
b. Item serial number(s) (Effectivity)
c. Top drawing number
d. Item specification identification number

See Related Paragraph in Main Body

Drawing Elements

a. Drawing number
b. Drawing title
c. CAGE code
d. Number of sheets
e. Date of release
f. Drawing change or revision letter and release date of authorizing document which directed the change or revision
g. Ancillary document numbers; e.g., engineering change notices, engineering orders
h. Specification document, specification control drawing, or source control drawing number

Part Number Elements

a. Controlling drawing number
b. Part numbers released
c. Identification of change that created the part number

Elements of Data for Software Items

The release records should reference the software CSCI Version Description Document that contains the elements required in the contract and the guidance provided in IEEE/EIA 12207.1.

Z.2.10 3.4 Configuration Status Accounting Data. The configuration status accounting should provide data on the status of systems, CIs, and changes. The most effective implementation is a relational database or product data manager where each object below can be related to other objects so that data doesn't have to be re-entered in multiple places. The configuration status accounting system should include the data specified below:

a. Change Package
   - Number/PCN
   - Status (Open, Closed)

b. Change Request/Proposal or Deviation/Waiver
   - Number
   - Revision identifier
   - Title
   - Date

See Related Paragraph in Main Body

- Change Package Number
- Data affected (proposed)
- CIs affected (proposed)
- Effectivity (proposed)
- Authorizing CBD
- CCB with disposition authority
- Status (Open, Closed)

c. Data (Document, Drawing, etc.)
- Number
- Revision letter
- Title
- Effective Date
- CCB with disposition authority
- Authorizing CBD
- Status (Draft, Approved, Released, etc.)

d. Control Board Directive (CBD)
- Number
- Revision
- Date Dispositioned
- Disposition (Approved, Disapproved, etc.)
- Change Package Number
- Data affected
- CIs affected
- Effectivity
- Changes/Deviation/Waivers being dispositioned
- CCB with disposition authority
- Implementation Actions
- Status (Open, Closed).

e. CBD Implementation Actions
- Number
- Suspense Date
- Actionee Name
- CBD that authorized actions
- CCB that authorized actions
- Change Package Number
- Data affected

See Related Paragraph in Main Body

- CIs affected
- Effectivity
- Status (Open, Closed)

f. Configuration Item (CI)
- Name or Number
- Top Assembly Part Number

g. Modification Kits
- Change describing mod kit
- CBD authorizing mod kit
- CIs affected
- Effectivity (serial numbers, etc.)
- Location of each item to be modified
- Scheduled ship dates for mod kits
- Date each modification is installed.

APPENDIX Z.3. Guidance for FCA/PCA

Z.3.1 This appendix provides guidance for conducting a Functional Configuration Audit (FCA) and Physical Configuration Audit (PCA). It includes guidance for the data package to be made available for audit, and for preparation of an audit review plan which details roles and responsibilities for providing data and conducting the audit. The sample plan and audit description in this appendix are based on a project where MSFC is the design activity, but the data package and conduct of the audit are elements applicable to any organization conducting a FCA/PCA.

Project FCA/PCA plans address overall planning for completion of the FCA/PCA objectives by all NASA and contractor organizations involved in delivering configuration items which affect the top level configuration item(s). The FCA/PCA for each individual CI is performed by the CI design activity with the FCA/PCA plan for that CI developed by the design activity. The NASA representatives participate in the design activity's audit by auditing the results of the design activity's completed FCA/PCA, such as the completed as-designed/as-built comparison.

TABLE Z.3.1: REPRESENTATIVE AUDIT DATA LIST

FCA	PCA
• Specifications	• Final version of all specifications
• Drawings and parts list	• Product drawings and parts list
• Engineering Change Proposals/ Engineering Change Requests (ECPs/ ECRs), & Deviation/Waiver Approval Requests (DARs) incorporated and pending	• Configuration accounting and status reports
• Specification and drawing tree	• Final version of all software documents
• Fracture control plan	• Final version of software description document
• Structural dynamics, analyses, loads, and models documentation (updated)	• Copy of all FCA findings for each Configuration Item (CI)
• Materials Usage Agreements (MUAs)	• List of approved and outstanding ECPs and DARs
• Material Identification Usage List (MIUL)	• Copies of ECPs and DARs as requested at the audit
• Certificate of Qualification(s) (COQs)	• Indentured parts list/as-designed configuration definition
• Verification procedures and requirements	• As run test procedures (when applicable, include any test discrepancy records)
• Complete list of successfully accomplished tests and test results	• Drawing and specification tree
• Complete list of successful tests if detailed test data are not recorded	• Copy of parts tags or verification closure for verification items verified by inspection

TABLE Z.3.1: REPRESENTATIVE AUDIT DATA LIST

FCA	PCA
	method
• Complete list of tests required but not performed	• Manufacturing & inspection (build) records
• Software verification data	• Inspection records or inspection verification closures
• Software development documents	• As-built electronic data
• Software version description	• Discrepancy Reports (DRs)
• Critical Design Review (CDR) completion documentation; Review Item Discrepancies (RIDs) and dispositions report	• Log Books
• Mission constraints	
• Nonconformance reports	
• Interface control drawings/documents (ICDs)	
• Test plans and procedures	
• Test reports	
• Verification closures	
• Verification tracking log	
• Analysis reports	
• ALERTS tracking log	
• Hazard analysis/risk assessment	

Z.3.2 FCA/PCA Plan Example

1. Purpose

[*This section describes the overall planning for the conduct of the FCA/PCA, as required by MPR 8040.1. See example below.]*

This plan defines the schedule, membership, data/documentation requirements, action/actionee assignments and closeout, and the support necessary for the [*project name]* FCA/PCA. In the event a delta FCA/PCA is required, this same plan is to be used unless otherwise specified.

2. Objectives

[*This section describes objectives of the FCA/PCA. See example below.]*

The objectives of the FCA/PCA are as follows:

2.1 Verify that the functional performance complies with the end item specification.

2.2 Verify that the as-built and the as-designed configurations are the same. If there are differences, provide reconciliation rationale for those differences.

2.3 Provide documented rationale for closeout of discrepancies uncovered by the audit.

3. Schedule

[*This section identifies the relevant milestones for this FCA/PCA. See example below.]*

TBD	FCA/PCA Plan Available
TBD	Data Package Available
TBD	FCA/PCA Kickoff
TBD	Conduct FCA/PCA
TBD	Action/Actionee Resolutions
TBD	Review Group (If required)

4. Hardware

[*This section identifies the hardware/software elements to be audited for this FCA/PCA. See example below.]*

The FCA/PCA is conducted for the following assemblies:

- [*Name of Configuration Items (CIs)/Computer Software Configuration Items (CSCIs)]*
- *[Name of Assemblies]*
- *[Other Items to be Audited]*

5. Review Process

[*This section describes the process to be used for the FCA/PCA. See example below.]*

The FCA/PCA review data packages are located in a reserved room, close to the manufacturing and quality data, for the team members to conduct the audit. The FCA/PCA review process starts with a kick-off meeting to familiarize the reviewers with the items to be audited and to review logistics. To assist the SE and the PM in assigning and compiling the actions and actionees for closeout, utilize the format of Figure 1. The audit proceeds with reviewers assigned to the teams as identified in section 5.2. The responsible design organizations' team members focus on design and performance. The S&MA teams review inspection records and as-built and test documentation in conjunction with the hardware. The configuration management team members review and compare the as-designed and the as-built data.

The team members report their findings to the SE. The SE and PM reviews the discrepancies and assigns the appropriate project personnel or contractors to resolve the issues as required. The project logs all discrepancies or findings on a Discrepancy Tracking Log (see example on Table 5.0). The project provides status reporting and tracking against the log.

At the conclusion of the review, if required, a review group convenes to address the discrepancies and/or findings that could not be closed during the audit. The FCA/PCA review group members are identified in section 5.3.

Table 5.0 Discrepancies Tracking Log
Each issue is assigned a sequential number.

Issue Number	Description of Issue	PM/SE Assignment of Action/ Actionee	Due Date	Review Group Disposition If Required	Status

5.1 Review Data Package

The data package contents and responsibility for preparation should be identified (Organization of Primary Responsibility Designees (OPRD) are identified in Table 5.1-1.) Documentation such as manufacturing instructions, work orders, and parts tags, which are not normally be copied are made available as required. These should be specified in the NOTES section of the table. The documents listed in Table 5.1-2 are for reference. These documents define the

program requirements and/or provide information of value to the FCA/PCA participants but are not subject to review.

Table 5.1-1 Data Package Contents Audit Documents

Document Number	Title	OPRD	Due Date	Notes

Table 5.1-2 Data Package Contents Reference Documents

Document Number	Title	OPRD	Due Date	Notes

5.2 Team Organization

[This section describes team organization and membership. See examples below. Tailoring of the specific team responsibilities for each project may be required.]

5.2.1 The SE coordinates the schedules, logistics, and related issues, including records retention.

5.2.2 The Responsible Design Organization (RDO) reviews hardware design and performance as dictated by requirements specified in the End Item Specification and its flow-down requirements. Other areas of emphasis include deviations and waivers, nonstandard parts, and drawings.

RDO Team:

Area of Responsibility:	Name/Office Symbol:
Team Lead	TBD
Stress	TBD
Mechanical Design	TBD
Structural Test	TBD
Thermal	TBD
Materials	TBD
Program Office Representative	TBD
KSC Representative	TBD

Contractor Representative	TBD

5.2.3 Safety and Mission Assurance generates the as-built electronic data file and documentation from the inspection records and review manufacturing documentation (build paper) for completeness of inspection records, tags, and acceptance data package. In-house projects identify the required support and records required from the manufacturer's quality assurance personnel.

S&MA Team:

Area of Responsibility:	Name/Office Symbol:
S&MA (Team Lead)	TBD
Manufacturing	TBD
Quality Assurance Contractor	TBD
Manufacturing Contractor	TBD

5.2.4 Configuration Management performs the as-designed/as- built physical comparison and review changes and configuration accounting.

CM Team:

Area of Responsibility:	Name/Office Symbol:
Project Configuration Management (Team Lead)	TBD
Data Management	TBD
Configuration Management	TBD

5.3 FCA/PCA Review Group

The FCA/PCA Review Group addresses all open issues/open work and assigns action(s) as necessary. Upon completion of the FCA/PCA Review Group meeting, the FCA/PCA Certificate of Completion are issued contingent upon completion of the open actions/open work. The Review Group members are identified below:

Chairperson	TBD (Dir. or Dept. Manager)
ED Representative	TBD (Department Manager)
S&MA Representative	TBD (Department Manager)
Customer Representative	TBD (Program Office Rep.)
KSC Representative	TBD
Others as Required by Project	

Action Item
(FCA/PCA)

CI/CSCI Number: **Nomenclature:** **Development/Process Center:** _____		**Date**: **Page _ of ___**
Developer/Subcontractor:	**Audit/Review Location:**	**Tracking Number:**
Title/Summary: **Discrepancy:**		
Recommended Solution/Action		
Category ☐ **Low** ☐ **Medium** ☐ **High**	**Audit Type** ☐ **FCA** ☐ **PCA**	
Subsystem(s)	**Initiator** (Name, Phone #)**:**	
Audited organization Chairperson:	**Action Assigned To** (Name, Phone #)**:**	
Closure Submittal **Date** ____/____/____	**MSFC Chairperson:**	
Closure (Attach closure information)**:**		
Closure Approval: _____ _____ **Chairperson** **Signature**	**Action Item Closure Date:** ___/___/	

FIGURE 1

[Project Name]

FCA/PCA

Certificate of Completion

_____ _____

[Chairperson] Date

_____ _____

[Review Group Member] Date

_____ _____

[Review Group Member] Date

_____ _____

[Review Group Member] Date

The Review Group hereby certifies that the subject audit is complete contingent upon closure of the following open actions/open work:

[Reference the list of open actions/open work if necessary.]

APPENDIX Z.4. Guidance for CM Audits

Z.4.1 Purpose

This chapter defines the requirements and guidelines to be followed in a CM Audit. The purpose of the audit is to ensure that the audited organization is compliant with the configuration management requirements of the project. That is, the configuration baseline is correctly defined, controlled, accounted for and verified, and any required corrective actions resulting from the audit are implemented.

Z.4.2 CM Audit Notification

The project manager provides formal notification to the audited organization that an audit is to be conducted. As a minimum, this notification identifies the location, date and time of the audit, the project audit team membership, and the requirements of the audit, or the notification may reference the audit plan for these items. The notification also transmits the plan to be used for the audit. The notification letter identifies the type of audit (one-part or two-part) to be conducted.

Z.4.2.1 The following is an example notification for the one-part audit:

"The MSFC Configuration Management Audit Team plans to perform an in-depth evaluation within the scheduled timeframe of the configuration management program and related activities. The audit is to be conducted in accordance with the following paragraphs."

Z.4.2.2 The following is an example for the two-part audit:

"This audit is a two-part audit. Phase I consists of a self-assessment performed by (identify the contractor/MSFC in-house organization) personnel who are involved in and knowledgeable of the configuration management requirements, procedures and processes, procurement, engineering, manufacturing planning, manufacturing, and quality control operations. (Identify the contractor/MSFC in-house organization) reviews and evaluates their compliance with contractual/project-imposed configuration management requirements (or specific identified requirements) and their internal configuration management requirements and procedures. This assessment activity is conducted jointly with all members of the team to ensure that each of the respective disciplines and functional entities interface with those who are generating the requirements and those who are implementing the requirements. The purpose of this activity is to ensure compliance with the external and internal imposed requirements and to identify any problems associated with the implementation of the requirements. (Identify the contractor/MSFC in-house organization) documents their findings/observations and recommended corrective actions.

Phase II consists of an assessment by the auditor of the Phase I findings and recommendations and any indepth review determined necessary by the auditor."

Z.4.3 CM Audit Plan

A CM Audit Plan is prepared and approved by the project that defines the requirements and guidelines to be applied during the audit. The plan defines the type (one-part or two-part) of audit required.

Z.4.4 CM Audit Plan Content

The following paragraphs describe the suggested content for the CM Audit Plan. The CM Audit Plan describes the roles and responsibilities of the auditor and audited organization, and describes how the audit is to be conducted.

Z.4.4.1 Purpose

Describe the purpose of the CM Audit Plan. "This plan defines the requirements and guidelines to be followed in the (project name) configuration management audit."

Z.4.4.2 Audit Objectives and Scope

Describe the CM Audit objectives. "The objective of this audit is to verify the adequacy of the (project name) configuration management system and to ensure compliance with (identify contractual or in-house document). Required corrective action for inadequacies and noncompliances identified during the audit will be defined."

Z.4.4.3 Audit Baseline

Identify the documents that define the baseline to be used for the audit. The baseline consists of the CM requirements that the audited organization is audited against. If a requirement in the audit baseline is not being met, this is a basis for a Finding to be written. For a MSFC in-house audit, the audit baseline would typically consist of the Project CM Plan, the MSFC Directives and/or Project-unique CM requirements, and procedural documents associated with these documents, plus contract CM requirements for any contracts managed by the MSFC in-house organization. For a contractor audit, the audit baseline would typically include the contract statement of work (SOW) and data procurement document (DPD), any documents containing CM requirements made applicable by the SOW/DPD, and the contractor CM Plan and associated procedures.

Z.4.4.4 MSFC Audit Team Membership

Identify the chairperson and team members. The MSFC Configuration and Data Management Group, in conjunction with the project manager, appoints the team chairperson and membership.

Z.4.4.5 Audit Location and Schedule

Identify the location and schedule for the audit.

Z.4.4.6 Administrative Support

Identify the administrative support to be provided by the audited organization. Normally, this support includes meeting facilities, clerical support, telephones, computers and associated equipment, office space and furnishings, reproduction equipment, and copies of the CM audit

baseline documentation for the audit team members. The CM audit baseline documentation should be provided to the audit team chairperson a sufficient time period prior to the start of the audit in order that the auditor has adequate time to review and become familiar with the appropriate data and information. Also, the plan should specify additional information and associated documents that the audit team requires to be available during the audit. Lead times for the provisioning/installation of telephones, computers, and copiers should be accounted for in the audit schedule. Lead times are normally defined in each respective contract; if not, they should be specified in the audit plan.

Z.4.4.7 Configuration Management Support

Identify the required support to be provided by the audited organization. This should include at least one senior configuration management individual assigned solely and full-time for the duration of the audit. Additionally, other applicable individuals should be available to meet with the audit team members for the purpose of answering questions, providing information and data, explaining procedures and operations, etc.

Further, the audited organization should identify and provide a senior representative who has the authority to obligate the organization and accept, reject, or negotiate the team's findings/observations. This responsibility includes documentation/submission of any proposals for closure and documentation submittal of root cause.

Z.4.4.8 Audit Process

Z.4.4.8.1 Preaudit Activities

Describe the Preaudit activities to be performed. These activities are applicable to both one-part and two-part audits. Preaudit activities typically consist of the following:

a. Team Preparation. Each audit team member is required to be familiar with the audit baseline and the applicable requirements, procedures, instructions, etc., in order to efficiently and effectively accomplish the audit. Each member is preassigned specific area(s) of responsibilities by the team chairperson.

b. Preaudit Conference. A preaudit conference is held between the auditor and audited organization in order to review the following:

(1) Address the purpose and objectives of the audit.

(2) Address the logistical aspects of the audit.
(3) Identify required documentation in advance by the team members.

(4) Discuss areas to be audited and the manner in which the audit is to be conducted.

(5) Determine the status of administrative functions, which should be prearranged in order to

achieve an effective and efficient audit.

Z.4.4.8.2 Audit Activities

Describe the audit activities that are required to conduct the audit. The typical activities for a CM audit are described in the following paragraphs. These activities are applicable to both one-part and two-part audits.

a. Entrance Briefing. An entrance briefing serves as the initiation of the audit. The chairperson outlines the audit activities, schedules, responsibilities, and the method of documenting findings/observations. The audited organization addresses their organization and operations, specific subjects of interest that have been requested via the preaudit conference, and any other subjects which the organization believes are beneficial to the audit team.

b. Audit Focus. The audit normally is focused on the following areas of configuration management:

(1) Organization
(2) Configuration Identification
(3) Change Control
(4) Change Status and Accounting
(5) Subcontractor/Vendor Configuration Management
(6) Drawing Release System
(7) Documentation Release System
(8) Configuration Verification

The focus areas may be limited to specific areas as deemed appropriate. In the event different areas of focus are to be addressed in a two-part audit, the focus areas for each part of the audit should be described.

c. Team Reviews. The audit is conducted in accordance with the plan as defined in the audit notification letter. Phase I is conducted in accordance with the plan prepared by the audited organization. An audit checklist is provided in Table Z.4.1. The checklist may be used as determined appropriate. The audit procedure may include group presentations, one-on-one interviews, review of procedures and processes, analysis of the audited organization's change proposal and change implementation documentation, engineering, manufacturing planning, and observation of systems operation.

d. Team Findings/Observations. All noted concerns are identified and documented using the Audit Finding/Observation Record (reference Figure X that provides the format to be followed; sizing of the various areas for the headings is optional). The findings/observations contain the following:

(1) An accurate description of the finding/observation in sufficient detail to provide conclusive definition and evidence of the existing situation, and

(2) An indication of the level of concern using the "finding" and "observation" categories as defined below.

Finding – The program/system deficiencies or irregularities noted in the areas, which are controlled by the MSFC project. Recommendations in these areas are intended to realign the system to conform to contractual requirements and/or internal requirements and procedures to prevent recurrence of the finding.

Observation – The program/system deficiencies or irregularities noted in areas not directly controlled by the MSFC project that needs improvement for maximum effectiveness. Recommendations in these areas are intended to provide the program/system element with a more effective system.

NOTE: Any findings/observations that pertain to flight safety or are mandatory which are to be corrected prior to the next application of the respective task/operation are so noted on the Audit Finding/Observation Record.

e. Daily Briefing. A daily briefing is held between the auditor and audited organization to present findings/observations identified. This activity may also address recommended corrective actions and target dates for closures. A copy of the findings/observations are provided to the audited organization. The audited senior representative is given the opportunity to accept/reject/modify the findings/observations and provide alternate proposals for corrective actions and closure rationale.

f. Two-part Audit Review. When a two-part audit is conducted, the findings/observations from Phase I are presented to the MSFC audit team who is responsible for determining the validity and acceptability of the finding and recommended corrective action.

g. Exit Briefing. An exit briefing is held with the audited organization to present the results of the audit and, as a minimum, present and discuss the findings/observations and any unresolved issues. A copy of each finding/observation is presented to the audited organization. Any unresolved issues are subsequently presented to the project manager for resolution.

h. Audited Organization Closure Rationale. On the audit finding/observation record, the audited senior representative indicates the closure rationale, including the root cause, and provides a completion date.

Z.4.4.8.3 Post-Audit Activities

The following activities occur following the completion of the audit:

a. Audit Report. The chairperson prepares a written report addressing the team's activities and findings/observations. The report may, in addition to the findings/observations, recommend

requirements or procedural changes to the audited organization's configuration management system. This report is provided to the project manager by memorandum within 30 calendar days following the conclusion of the audit. If desired by the project manager, a team briefing is provided. A sample configuration management audit report is provided in Figure 3.

b. Audit Closure. The project tracks each finding/observation through closure. The closure paper is routed to the finding/observation initiator and then to the chairperson for concurrence before submitting to the project manager for approval. If either the finding/observation initiator, chairperson, or project manager nonconcurs with the proposed closure, rationale for the nonconcurrence should be documented and attached to the closure form. If there were any findings/observations that the audited organization would not accept and the project manager accepted, the project office provides formal notification to the audited organization that the findings/observations are approved and corrective action is required.

c. Audited Organization. The audited organization implements the corrective actions as authorized by the project manager. The audited organization provides monthly status reports of findings/observations until all open findings/observations have been closed. This report includes pertinent data regarding the findings/observations; e.g., tracking number, subject, resolution submittal date, project receipt date, closure notification and date, and any pertinent remarks. If it is determined that a finding or observation cannot be closed by its scheduled due date, the audited organization notifies the chairperson explaining why the action cannot be completed by the scheduled due date and propose an alternate closure date. A mutually agreed upon revised scheduled due date is established.

d. Revisions to Closure Action. If a revision to a closed finding/observation is required after all signatures have been obtained, the Project initiates a new audit finding/observation record and identifies it with a revision notation.

TABLE Z.4.1: CONFIGURATION MANAGEMENT AUDIT CHECKLIST

	AUDIT SUBJECT	Answer (also list implementing plans or procedures, if applicable)	Procedure in Compliance Y/N
	GENERAL		
1	Is there adequate staffing of the Configuration Management Office (CMO)?		
2	Are CMO personnel areas of responsibility clearly defined?		
3	Are all applicable areas of CM staffed?		
4	Are personnel knowledgeable in their area of responsibility?		
5	What is the organizational relationship of the CMO to the project manager?		
6	Does the CMO have a direct line of communication with the project manager?		
7	Are the organizational relationships of the CMO and the other organizations documented?		
8	Is software CM handled by separate CM procedures?		
9	Is there a CM plan approved by MSFC?		
10	Are there any authorized deviations to contractual/in-house CM requirements?		
11	Are changes made to the approved CM plan in accordance with established project requirements?		
	CONFIGURATION IDENTIFICATION		
1	Is an equipment-planning chart (drawing tree) available down to the lowest repairable or spare part?		
2	Is there a specification tree?		
3	Is documentation (specifications, drawings, etc.) used to document requirements in accordance with project requirements?		
4	Are practices used for the preparation and maintenance of baseline documents in accordance with project requirements?		
5	Are responsibilities of each functional organization for identifying baseline documentation consistent and logical?		
6	Is the method(s) used for assigning and controlling identification numbers (CEI drawings, serial, and lot) in accordance with project requirements?		
7	Does the system have vertical traceability of requirements?		
8	Are the practices for scheduling, tracking, releasing, and maintaining identification of documentation to be baselined in accordance with project requirements?		

	AUDIT SUBJECT	Answer (also list implementing plans or procedures, if applicable)	Procedure in Compliance Y/N
9	Are modification kits identified in accordance with project requirements?		
10	Is the process used to identify, schedule, and track baseline documentation to be prepared and released in accordance with project requirements?		
11	What process is used to establish interface requirements?		
12	Are interface requirements referenced on released drawings?		
13	Are interface requirements established and contained in the requirement specification?		
14	Are subcontractors and vendors required to implement configuration identification?		
	CONFIGURATION CONTROL		
1	Is there a system for establishing configuration baselines, processing engineering changes, and making deviations and waivers to established baselines?		
2	Does a change integration and tracking system exist?		
3	Does the change integration and tracking system provide appropriate data to ensure total implementation of approved changes?		
4	Are Class I and Class II criteria defined?		
5	Has a CCB been chartered?		
6	Have the CCB membership and associated responsibilities been defined?		
7	Are the duties and functions of the CCB defined?		
8	Are changes being properly classified as Class I/Class II?		
9	Are change proposals adequate, descriptive, and timely, and do they include/identify all affected documents?		
10	Is there an adequate process for scheduling and presenting changes to the CCB?		
11	Who is responsible for scheduling and presenting changes to the CCB?		
12	Are engineering change proposals evaluated by appropriate organizations, including contractors if affected, to determine impact against engineering, production, reliability, planning, schedules, cost, logistics support, safety, and training efforts?		
13	Is the mechanism, documentation, and process used for proposing emergency changes at the launch site adequate?		
14	Is there a system to control interface		

	AUDIT SUBJECT	Answer (also list implementing plans or procedures, if applicable)	Procedure in Compliance Y/N
	requirements?		
15	Is the method used to document CCB decision and assign implementation instructions adequate?		
16	Does the time period between decision being made and issuance of instructions by the CCB support the project's needs?		
17	After field “make work” changes are authorized, are affected drawings updated and subsequent effectivities corrected by normal change paper?		
18	Are the approved configuration baselines clearly identified to all applicable organizations?		
19	Are software changes processed via the CM system?		
20	Do the CM master change files identify a change, its status, associated impacts, affected documentation (or identification thereof), contract status, and implementation status?		
21	Do the master files include both Class I and Class II changes?		
22	Is there a system for processing and controlling critical processes and components?		
23	Are Material Review Board actions processed in accordance with project requirements?		
24	Is there a system for controlling/changing part numbers?		
25	Is identification of the change approval authority on the engineering change documentation or in engineering release records?		
26	Are the practices concerning modification kits and instructions for incorporation of changes to delivered end items in accordance with project requirements?		
27	Is there a mechanism to prevent unauthorized changes?		
28	Is there a system for processing and controlling non-technical changes?		
29	Do subcontractors or vendors initiate a system for processing and controlling changes?		
30	Are the subcontractors and vendors required to implement configuration control?		
31	Are MSFC-directed changes properly impacted and implemented?		
32	Does the CMO maintain a library of all documentation controlled by the MSFC project office and the design activity?		
	CONFIGURATION ACCOUNTING		
1	Do configuration identification indexes and modification status reports exist?		

	AUDIT SUBJECT	Answer (also list implementing plans or procedures, if applicable)	Procedure in Compliance Y/N
2	Does the accounting system include all mandatory data?		
3	Is the frequency for updating the accounting system in accordance with project requirements?		
4	Is the configuration accounting system automated?		
5	Does management use the configuration accounting system?		
6	Is the configuration management accounting system being used properly?		
7	Are the configuration accounting records timely/accurate?		
8	Are proposed but not approved changes entered in the system?		
9	Are Class II changes entered into the system?		
10	Does the accounting system include deviations and waivers?		
11	Is compatibility with project office configuration accounting system maintained?		
12	Is there a requirement to conduct periodic review and “redline” of the MSFC Configuration Identification Index and Status Report and the ICD Index and Status Report?		
13	Does the accounting identify serial or lot numbers?		
14	Are serial/lot numbers recorded on next assembly build paper?		
15	Are serial numbers/lot numbers shown on as-built configuration list?		
16	Are components or piece parts used that are not serialized or lot numbered? If so, what is the tracking procedure? Need to discuss intent.		
17	Are there any unique requirements for release of software and critical process documentation?		
18	Is “open”/transfer work tracked?		
19	How are modification kits tracked?		
20	How are modification kits closed out?		
21	Are modification kits tracked against major milestones?		
22	Does the as-built definition include deviations/waivers?		
	DOCUMENTATION RELEASE		
1	Are the practices for drawing/document release in accordance with project requirements?		
2	Does the process identify documentation required to be controlled by the release desk?		
3	Is there evidence that the required signatures/ approvals are affected prior to release?		

	AUDIT SUBJECT	Answer (also list implementing plans or procedures, if applicable)	Procedure in Compliance Y/N
4	Are engineering orders to drawings incorporated in accordance with project requirements?		
5	Are Class I and Class II engineering change packages completely released prior to formal acceptance of the end item unit where first installed?		
6	Is production change effectivity called out in release records?		
7	Do manufacturing and quality verify they have the correct released documentation for the particular end item being produced?		
	CONFIGURATION VERIFICATION		
1	Are deltas between the as-designed and the as-built configuration identified?		
2	Does the change verification system provide a clear audit trail from change authorization to incorporation for all items of the change package?		
3	How are configuration management reviews and inspections conducted?		
4	Are Review Item Discrepancies (RIDs) tracked and closed?		
5	Do CM personnel have a role in design reviews and configuration inspections?		
6	Does the verification process include subcontractor/vendor engineering changes?		

Project:	CONFIGURATION MANAGEMENT (CM) AUDIT FINDING/OBSERVATION RECORD	Date:	Page _of ___
Number:		☐ One-Part ☐ Two-Part – Phase I ☐ Two-Part – Phase II	
☐ Finding ☐ Observation	Evaluator (Auditor's) Name:		

Finding/Observation Description and Root Cause (Evaluator - Describe the Discrepancy or Observation and state the Requirement being violated, if applicable):

Comments/Recommended Action/Due Date (Evaluator – Provide additional comments and/or describe a recommended action and due date):

Chairperson Concurrence	Audited Senior Representative Concurrence
Name: _____ Date: _____	Name: _____ Date: _____

Corrective Action/Due Date (Audited Representative - Record planned corrective action and due date as agreed to by the audit chairperson and audited representative):

Action Concurrence

Chairperson: _____ Date: _____	Audited Senior Representative: _____ Date: _____

Closure Rationale/Completion Date (Actionee – enter corrective action closure description and attach closure evidence, if applicable):

Closure Approval

Chairperson: _____ Date: _____	Audited organization Management: _____ Date: _____

Finding/Observation Process

NOTE: Findings/Observations may address areas of project planning and implementation related to requirements/design maturity, baseline maturity vs. project activities, C&DM related milestones such as FCA/PCA and Sustaining Engineering, etc. For these type of Findings/Observations, it is recognized that C&DM is not in direct control of project planning, and that the project sometimes accepts risk to proceed with work and meet schedules. The intent of documenting these issues is to ensure that the Project is aware of the risk, and has action plans in place to alleviate or address the risk. If action plans are in place, the corrective action for the Finding/Observation may be to state the Project actions in process.

1) Evaluator completes the following fields:

   Project: Project name being audited.

   Page __ of ___: Page number and total number of pages of the Finding/Observation.

   Number: Finding/Observation number. Number format is Project Acronym-Evaluators 3 Initials-sequential number for that evaluator (e.g., ECLSS-ASH-01).

   Finding/Observation Check Blocks: Indicate whether the record is a Finding or an Observation. This serves as a recommendation to the Audit Chairperson who makes the final decision on this value.

   Evaluator Name: Name of person writing the Finding/Observation.

   Date: Date that the Finding/Observation was documented.

   Finding/Observation Description and Root Cause: Describe the discrepancy or observation, state how the discrepancy was found/evidence of the discrepancy, and state the requirement or procedure violated (e.g., "PCN files CD00003, CD00025, and CD00050 did not contain the information required by OI ED43-026. CD00003 was missing the ECR form, CD00025 index was incomplete, ..."). Provide as much detail as possible to promote understanding and justification for the finding/observation.

   Comments/Recommended Action/Due Date: Provide any additional comments and a recommended action that would correct the finding/observation.

2) Evaluator provides the Finding/Observation to the Audit Chairperson for review.

3) Audit Chairperson reviews to ensure that the information is complete and understandable. Chairperson may ask the evaluator to expand or alter the Finding/Observation to ensure complete information is captured. The Chairperson determines whether it is a Finding or

Observation. The Chairperson provides the Finding/Observation to the Audited Senior Representative for review.

4) The Audit Chairperson and Finding/Observation Initiator discuss the Finding/Observation with the Audited Senior Representative to ensure understanding and agreement, and may review the evidence of the Finding/Observation. This discussion may occur real-time during the Audit activities, or at End of Day meeting between the Audit Team and Audited Organization's Team. If the Audited Senior Representative has additional information that changes the Finding/Observation, the Finding/Observation should be altered to more correctly express the problem or aid understanding. Possible corrective actions may also be discussed at this time.

5) If the Audit Chairperson and Audited Senior Representative agree that the documented Finding/Observation is valid, they sign in the "Chairperson Concurrence" and "Audited Senior Representative Concurrence" blocks. If there is disagreement over the validity of the Finding/Observation, the designated Audit Advisor makes a determination. If there is still disagreement, the Project Manager or project-selected designee is asked to make the determination.

6) The Audited Senior Representative fills in the planned Corrective Action/Due Date block with a planned action and suspense date. If the specific action is not known at that time, due to uncertainty or inability to change project requirements, processes, schedule, or resources, the action should state that the corrective action is to be investigated and finalized by a suspense date (e.g., "Possible corrective action is.... Consult with project and provide corrective action by ____ (suspense date).").

7) The Corrective Action/Due Date is reviewed by the Audit Chairperson and if agreed, the Action Concurrence block is signed by the Audit Chairperson and Audited Senior Representative.

8) After the Exit Briefing, the Audited Senior Representative completes the Closure Rationale block with action closure information and submits action closure to the Audit Chairperson.

FIGURE Z.4.3. SAMPLE CONFIGURATION MANAGEMENT AUDIT REPORT

CONFIGURATION MANAGEMENT AUDIT REPORT

CONTRACT NAS8-XXXXX

(*Date of Audit*)

Prepared by:

_____*(Signature)*_____ ____*(Date)*___

Audit Chairperson, _____(Project)_____ Office

CONFIGURATION MANAGEMENT AUDIT REPORT

1. SUMMARY

An audit of *(audited organization)* CM program was conducted by an MSFC team at the organization's facilities at *(location of audit)* during the period *(inclusive dates of audit).* The audit was conducted as delineated in the configuration management audit notification letter and attached plan. See attachment.

A total of *(number of findings)* findings and *(number of observations)* observations were identified during the audit. *(Insert a brief synopsis of any significant findings/observations, or any problems that may have occurred during the audit.)*

2. AUDIT ACTIVITIES

2.1 Purpose. The purpose of the audit was to review and evaluate the *(Project)* configuration management system and operations to ensure compliance with requirements, provide guidance for improved operation, and to identify inadequacies in procedures and operations.

2.2 *Audit Baseline. The audit baseline consisted of the following, as applicable:*

2.2.1 The applicable portion of contract/statement of work

2.2.2 The applicable data requirements

2.2.3 The baselined copy of the configuration management plan

2.3 MSFC Audit Team Organization. The MSFC audit team was composed of the following:

Chairperson: _____
Member: _____
Member: _____
Member: _____
Member: _____

2.4 Audit Process

2.4.1 The audit was conducted using the following audit techniques:

2.4.1.1 Comparison of MSFC requirements against *(audited organization)* policies, plans, procedures, etc.

2.4.1.2 Personnel interviews.

2.4.1.3 Group presentations/briefings.

2.4.1.4 Inspection/analysis of change documentation, reports, manufacturing work authorization documents, etc.

2.4.2 The major elements reviewed/addressed via the audit were as follows: *(Insert appropriate areas covered during audit.)*

2.5 Exit Briefing

A formal exit briefing presentation was provided to (audited organization*)* management by the MSFC audit team. The findings/observations were reviewed and discussed.

3. FINDING/OBSERVATION, TRACKING, AND CLOSURE

Attachment 1 contains all findings/observations of the (*specify one-part or two-part audit*). Each finding/observation is tracked by the MSFC *(Project)* Office until formal closure. The MSFC audit team chairperson concurs or non-concurs with the proposed closure, and the project manager takes the action to formally close the finding/observation.